Vol 5 No.2 (2026) - Mei, pp 2097-2108 https://www.doi.org/10.59025/ekaf8f47

Jurnal Masyarakat Madani Indonesia
e-ISSN: 2829-6702
https://syadani.onlinelibrary.id/

Greenovasi and Planting Class: Collaborative Greenhouse Development and Planting Education for Village Food Self-Sufficiency

Ni'matul Izza[*1], Rafael Hario Rivandi[2], Latifah Maharani[3], Septira Arshiana[4], Fathan Fahmi[5], Irvan Shofiyanto[6], Salma Azizah Asy Syahidah[4]

[1]*Bioprocess Engineering Study Program, Faculty ofAgricultural Technology, Universitas Brawijaya, Jl. Veteran, Malang, East Java, Indonesia 65145*
[2]*Animal Science, Faculty of Animal Science, Universitas Brawijaya, Jl. Veteran, Malang, East Java, Indonesia 65145*
[3]*Environmental Engineering, Faculty ofAgricultural Technology, Universitas Brawijaya, Jl. Veteran, Malang, East Java, Indonesia 65145*
[4]*Agribussiness, Faculty of Agriculture, Universitas Brawijaya, Jl. Veteran, Malang, East Java, Indonesia 65145*
[5]*MI Almaarif 02 Singosari, Jl. Masjid No. 33, Singosari, Kab. Malang 65153*
6Civil Engineering, Faculty of Engineering, Universitas Brawijaya, Jl. Veteran, Malang, East Java, Indonesia 65145

INFO ARTIKEL

Diserahkan 08/05/2026
Direvisi 16/05/2026
Diterima 29/05/2026
Diterbitkan 20/06/2026

***Kata Kunci*:**

Community Empowerment, Environmental Education, Food security, Greenhouse, Sustainable Agriculture

ABSTRAK

Pagentan Village is characterized by high population density and extensive land conversion into residential areas, resulting in limited agricultural land and green open spaces. This condition weakens local food security and limits practice-based environmental education, particularly at the elementary school level. In response, the "Village Greenovation and Planting Class" program was implemented to promote community empowerment and environmental education. The program involved residents of RT 06 RW 04 and students of MI Al-Ma'arif 02 Pagentan through activities such as the construction of an eco-friendly greenhouse, training in sustainable agricultural practices, and the integration of planting activities into thematic learning. The program aimed to strengthen food security through collaborative greenhouse management, enhance community capacity in environmentally friendly cultivation techniques, and instill environmental awareness and independence among students from an early age. The implementation results showed increased community knowledge and skills in sustainable agriculture, optimized use of limited land, and greater student participation in environment-based learning. Through collaboration between the local community and the school, the program successfully developed a greenhouse for independent food production while fostering environmental values and sustainable farming skills.

Corresponding author email:
izza_nimatul@ub.ac.id

Copyright@ Author (2026). Published by Alesha Media Digital. This is an open access article under the CC BY SA license. All writings published in this journal are personal views of the author and do not represent the views of this journal and the author's affiliated institutions.

1. INTRODUCTION

The conversion of agricultural land into residential areas is a common phenomenon occurring in suburban villages, including Pagentan Village [1]. High population density and the lack of green open spaces have led to limited productive land, resulting in weak local food security and reduced opportunities for residents to engage in direct agricultural practices. This is consistent with the study which states that the process of global urbanization has serious consequences for the availability of agricultural land [2]. One of its main impacts is the conversion of rice fields into new urban areas, such as residential zones and urban infrastructure. Such land-use changes reduce the area available for food production. Moreover, practice-based environmental education is still minimally implemented, particularly at the elementary school level, even though early environmental

education plays a crucial role in shaping environmental awareness and future food independence. Consequently, it is essential for children at the elementary level to be introduced to environmental issues, enabling them to cultivate environmentally conscious attitudes and a sense of care from the outset of their development [3].

In response to these issues, the Village Greenovation and Planting Class Program was initiated as a form of community empowerment and integrated environmental education. This program involves residents of RT 06 RW 04 Pagentan Village and students of MI Al-Ma'arif 02 Pagentan in a series of activities, including the construction of an environmentally friendly greenhouse, training in sustainable agricultural techniques for the community, and the integration of planting practices into thematic learning processes at school. The program aims to enhance food security through the collaborative management of the greenhouse, improve the community's capacity in environmentally friendly cultivation techniques, and instill values of environmental care and independence from an early age among the students.

The implementation of the program has shown positive outcomes, such as increased community knowledge and skills in sustainable agricultural practices, optimized use of limited land, and greater student involvement in environment-based learning. The collaboration between the RT 06 RW 04 community and MI Al-Ma'arif 02 not only results in a greenhouse as a means of independent food production but also strengthens the community's capacity in environmentally friendly farming and instills ecological values in students from an early age. Therefore, this program has the potential to become a model of community empowerment and sustainable environmental education in areas with limited land resources [4]. Both of these work programs can serve as a means to educate both citizens and school children about agriculture and the importance of maintaining an environment that supports the achievement of sustainable development goals (SDGs), especially point 4 (quality education), point 12 (Sustainable Consumption and Production), and point 13 (climate change action).

The "Greenovasi Desa and Planting Class" program aims to provide a tangible solution to the issues of limited agricultural land and the lack of practical, environmentally based education in Pagentan Village. Through the construction of an eco-friendly greenhouse managed collaboratively, this program seeks to strengthen local food security by optimizing limited spaces into productive areas for cultivating food crops. The initiative not only focuses on providing physical facilities but also on enhancing the capacity of the RT 06 RW 04 community in implementing sustainable agricultural practices, such as soil media management, organic fertilization, and environmentally friendly pest control. In addition to targeting the general community, the program is also designed to strengthen environmental education from an early age by integrating planting activities into the thematic learning process of students at MI Al-Ma'arif 02 Pagentan. This approach ensures that children not only understand agricultural concepts theoretically but also gain hands-on experience that fosters responsibility, independence, and environmental awareness [5]. The collaboration between residents and the school is expected to create positive synergy that generates long-term benefits in economic, social, and ecological aspects. This finding is consistent with the previous research which emphasized that programs involving multiple stakeholders are effective in enhancing environmental awareness and social participation. Such collaborations further demonstrate positive impacts that simultaneously address both social and ecological dimensions [6].

Overall, this program aims to establish a community empowerment model that combines simple agricultural technology with character education based on environmental values. It is hoped that the successful management of the greenhouse and the implementation of the planting class can serve as an inspiration for other areas to adopt similar concepts, ultimately achieving greater food self-sufficiency and environmental awareness at the village level.

2. METHODS

The implementation of the "Greenovasi Desa" and "Planting Class" programs was carried out through several integrated stages involving active participation from the RT 06 RW 04 community as well as students and teachers of MI Al-Ma'arif 02 Pagentan. The programs were implemented throughout July 2025 and were designed using a participatory approach to promote sustainability, strengthen community capacity, and encourage long-term engagement. The implementation stages are described as follows:

2.1 Planning and Coordination

The initial stage involved coordination meetings with key stakeholders, including the neighborhood leader, community representatives, teachers, and student representatives. Activities in this stage included:

a. Situation analysis: Identifying land conditions, environmental potential, and constraints faced by the community and school regarding greening initiatives and food availability.
b. Site selection: Determining strategic areas in the neighborhood for greenhouse construction and designating planting areas in the school yard.
c. Work plan formulation: Establishing schedules, activity flow, role distribution, and resource requirements. This stage was crucial to ensure all parties understood the objectives, roles, and benefits of the program, fostering a collective commitment.

2.2 Greenhouse Construction

Construction activities were carried out collaboratively, utilizing environmentally friendly and cost-effective materials such as PVC pipes, bamboo, or UV plastic. The steps included:

a. Land preparation: Clearing weeds, leveling the soil, and measuring according to the design plan.
b. Framework assembly: Building the greenhouse structure with considerations for air circulation, lighting, and durability.
c. Installation of planting systems: Implementing space-efficient systems such as vertical farming or simple hydroponics (Wick System / NFT).

2.3 Eco-Friendly Cultivation Training

Training sessions were provided to residents and teachers to enhance their skills in efficient and sustainable farming practices. The training covered:

a. Techniques for cultivating vegetables and fruits in limited spaces.
b. Water-efficient irrigation management.
c. Utilization of organic waste into compost or liquid fertilizer.
d. Principles of sustainable agriculture and urban farming concepts.

2.4 Implementation of the Planting Class at School

This program served as a direct educational medium for students through a learning-by-doing approach. The steps included:

a. Concept introduction: Delivering lessons on the importance of environmental stewardship, plant benefits, and basic planting methods.
b. Hands-on activities: Students practiced planting vegetables or ornamental plants in the school yard or using portable planting media.
c. Simple guides: Developing booklets or posters with easy-to-follow planting instructions.

2.5 Assistance and Monitoring

This stage was conducted periodically to ensure program continuity and proper plant management.

a. Assistance: Providing technical guidance, addressing plant pest or disease issues, and ensuring correct cultivation techniques.
b. Growth monitoring: Measuring plant development, harvest success rate, and the level of engagement from residents and students.

2.6 Evaluation and Replication

The final stage involved assessing the program's success using several indicators:

a. Improvement in participants' skills and knowledge.
b. Quantity of food production from the greenhouse and school garden.
c. Degree of community and student participation.

Based on the evaluation results, recommendations were formulated for improvement and strategies for replicating the program in other neighborhoods or schools.

3. RESULTS & DISCUSSION

3.1 Initial Community Problems and Program Needs Assessment

Pagentan Village, located in Singosari District, Malang Regency, is characterized by high population density and rapid land conversion into residential areas, resulting in limited agricultural land and green open spaces. This condition has reduced the community's capacity to implement household-scale food production and weakened environmental-based community activities. The preliminary assessment conducted by the service team identified that RT 06 RW 04 had unused land potential but lacked agricultural infrastructure, technical knowledge, and community-based farming facilities.

The needs assessment also revealed that environmental education practices at MI Al-Ma'arif 02 Pagentan had not been optimally integrated into practical learning activities. Although the school strongly supported character education and child-friendly learning, facilities for experiential environmental learning such as school gardens and planting activities were still limited. This condition indicated the necessity of a collaborative intervention that combined community empowerment, environmental education, and sustainable agriculture practices.

Based on discussions with village stakeholders, residents, and school representatives, two main priority issues were identified: (1) the lack of environmentally based independent farming facilities in RT 06 RW 04, and (2) the limited implementation of environment-based learning activities at MI Al-Ma'arif 02. Therefore, the "Village Greenovation and Planting Class" program was designed to address these interconnected social and environmental problems through participatory approaches involving local residents, elementary school students, teachers, and university students. Documentation of the initial discussion with village stakeholders and school representative can be seen in Figure 1.



Figure 1. Documentation of the discussion with village stakeholders (A) and school representative (B)

The findings of the initial assessment align with previous studies emphasizing the importance of urban agriculture and participatory green-space development in densely populated urban areas. Urban agriculture has been recognized as an effective strategy to improve local food security, strengthen social cohesion, and increase environmental awareness in urban communities [8]. Furthermore, participatory greenhouse development and hands-on agricultural learning have been reported to enhance community engagement and practical skill development in sustainable farming initiatives [9].

In the educational context, experiential learning approaches such as school gardening activities are considered effective in improving students' environmental awareness, practical understanding of sustainability, and character development [10]. Therefore, integrating planting activities into elementary school learning was considered highly relevant to strengthen environmental literacy and foster environmental responsibility from an early age.

The needs assessment also demonstrated strong community readiness and institutional support for the implementation of the program. Residents actively participated in planning discussions and agreed to provide land and voluntary labor for greenhouse construction, while the school committed to integrating environmental activities into student learning programs. This participatory foundation became an essential factor supporting the implementation and sustainability of the community service program.

3.2 Community Greenhouse Development Program

The greenhouse construction activities officially started on July 6, 2025, through collaborative community work (gotong royong) involving residents, university students, and local leaders (Figure 2). The activities included land leveling, greenhouse frame installation, workspace arrangement, and preparation of supporting materials. The construction process adopted a low-cost and environmentally friendly greenhouse design using lightweight structural materials and simple agricultural technology suitable for community-scale implementation. The greenhouse was designed as a practical model of urban agriculture that could be easily replicated in other densely populated neighborhoods with limited agricultural land.



Figure 2. Collective community work of RT 06 residents in greenhouse construction

An important aspect observed during the construction process was the strong collaborative culture among residents. Community participation was not limited to physical labor contribution but also included shared activities such as collective meal preparation and social interaction during the construction process. This collaborative atmosphere strengthened the social bonding between residents and the implementation team, reflecting the importance of local social capital in supporting community development programs.

The greenhouse inauguration was conducted on July 27, 2025, attended by RT and RW representatives, residents, and the MMD implementation team. The inauguration symbolized not only the completion of physical infrastructure development but also the beginning of community-based urban farming activities in Pagentan Village (Figure 3). The greenhouse subsequently functioned as a shared facility for cultivating

horticultural crops and promoting sustainable environmental practices among residents.



Figure 3. Greenhouse Innaguration with RT 06 Singosari Community

The implementation results showed that the program successfully achieved its primary target through the establishment of one functional small-to-medium-scale greenhouse that has been utilized for horticultural cultivation activities by local residents. More than 20 residents actively participated in the construction and training activities. In addition to infrastructure development, the community also received training related to hydroponic cultivation techniques, irrigation systems, growing media management, and plant maintenance. The evaluation results demonstrated a 20.32% increase in residents' knowledge regarding hydroponic farming systems after the training activities.

These findings indicate that the greenhouse development program did not merely provide physical agricultural infrastructure but also contributed to strengthening community capacity in sustainable urban farming practices. Similar studies have reported that community greenhouse programs can improve local food resilience, environmental awareness, and technical agricultural knowledge while simultaneously enhancing community participation and empowerment [11]. Furthermore, low-cost greenhouse systems and simple hydroponic technologies are considered highly appropriate for urban and peri-urban communities due to their adaptability, resource efficiency, and educational value.

Overall, the community greenhouse program successfully integrated environmental empowerment, food security enhancement, and participatory social engagement. The program also demonstrated the potential of university-community collaboration as an effective approach for developing sustainable community-based environmental initiatives.

3.3 Training on Sustainable Agriculture and Hydroponic Cultivation

Following the greenhouse construction stage, the program continued with training activities on sustainable agriculture and hydroponic cultivation for residents of RT 06 RW 04. The training aimed to improve community knowledge and practical skills related to environmentally friendly farming methods suitable for densely populated residential areas with limited agricultural land. The materials delivered included greenhouse management, hydroponic cultivation techniques, simple irrigation systems, plant maintenance, and compost production from household organic waste. The activities were conducted through interactive lectures, demonstrations, and direct practice sessions to ensure participants could understand and apply the techniques independently. Documentation can be seen in Figure 4.



Figure 4. Sustainable Agriculture and Hydroponic Training

The introduction of hydroponic systems was particularly relevant for urban communities because this cultivation method requires relatively limited land and water while allowing more controlled plant production. Previous studies have reported that hydroponic cultivation can support sustainable urban agriculture by improving resource efficiency and increasing local food production capacity [12]. In addition, the use of compost derived from household organic waste supported environmentally sustainable agricultural practices through nutrient recycling and waste reduction [13].

The effectiveness of the training program was evaluated using pre-test and post-test assessments. The results showed a significant increase in participants' understanding of hydroponic farming and greenhouse management after the training activities (Figure 5). The average score improvement reached 20.32%, indicating that the participatory and practice-based learning approach successfully enhanced residents' technical knowledge and farming skills. This finding demonstrates that hands-on community training can effectively strengthen local capacity in sustainable agriculture practices.

POST-TEST

NAMA :

1. Apa itu sistem hidroponik?
a. Menanam tanaman dengan tanah di sawah
b. Menanam tanaman menggunakan media air tanpa tanah
c. Menyiram tanaman setiap hari dengan tangan
d. Menanam tanaman langsung di atas beton

2. Nutrisi apa yang diperlukan dalam bercocok tanam secara hidroponik?
a. Pupuk organik cair
b. ZA
c. Nutrisi AB mix
d. KOH

3. Bahan apa yang diperlukan untuk budidaya dengan hidroponik sederhana?
a. Rockwool, flannel, benih, botol plastik
b. Baking soda, tepung, telur
c. Gula pasir, garam, minyak goreng
d. Detergent, spons, cuka dapur

4. Langkah apa yang dilakukan sebelum benih disemai pada rockwool?
a. Melembab rockwool dengan mencelupkan ke dalam air
b. Menjemur rockwool
c. Memberikan nutrisi AB mix pada rockwool
d. Menyiram tanaman pada instalasi

5. Apa fungsi pompa air dalam instalasi hidroponik sederhana?
a. Untuk menyemprot hama secara otomatis
b. Untuk memutar tanaman agar dapat sinar matahari
c. Untuk mengalirkan larutan nutrisi ke akar tanaman
d. Untuk mengisi ulang air hujan ke dalam botol

6. Apa kelebihan menggunakan pompa dalam sistem hidroponik dibandingkan tanpa pompa?
a. Tanaman lebih lambat tumbuh karena kekurangan air
b. Tanaman bisa lebih cepat panen karena nutrisi mengalir lancar
c. Tidak perlu menyiram setiap hari/saat kekeringan
d. Lebih rumit sehingga tanaman lebih mahal dijual

7. Mengapa botol plastik bekas bisa dimanfaatkan dalam sistem hidroponik?
a. Karena botol plastik bisa disulap jadi pupuk
b. Karena botol mudah dibakar setelah dipakai
c. Karena botol plastik bisa digunakan sebagai wadah tanam
d. Karena botol membuat tanaman jadi tumbuh otomatis

8. Mengapa sistem hidroponik cocok diterapkan di pemukiman yang padat atau sempit lahannya?
a. Karena bisa ditanam di pot bunga besar
b. Karena bisa menanam di atas genteng rumah
c. Karena bisa memanfaatkan ruang kecil dan lebih hemat air
d. Karena bisa langsung ditanam di jalanan pemukiman

9. Apa kegunaan kain flanel dalam sistem hidroponik sederhana?
a. Sebagai media tanam utama pengganti tanah
b. Sebagai alat pemotong tanaman saat panen
c. Sebagai sumbu untuk mengalirkan air dan nutrisi ke akar tanaman
d. Sebagai penutup tanaman agar tidak terkena sinar matahari

10. Apa kegunaan dari nutrisi AB Mix?
a. Untuk melembabkan media tanam
b. Untuk mencukupi kebutuhan unsur hara makro dan mikro pada tanaman
c. Untuk mempercepat panen
d. Untuk mengusir hama

EVALUASI KEGIATAN HARI INI



Figure 5. Assesment Tool and Average Pre- and Post-Test Results of Sustainable Agriculture and Hydroponic Training Questionnaire

Beyond improving technical competencies, the training activities also strengthened environmental awareness and collective participation among residents. The greenhouse was not only perceived as a food production facility but also as a shared learning space that encouraged community collaboration and environmental responsibility. Similar findings have been reported by [11], who emphasized that community-based urban agriculture programs contribute to food resilience, social engagement, and sustainable environmental behavior [11].

3.4 Implementation of the Planting Class Program at MI Al-Ma'arif 02

The Planting Class program was implemented as an environmental education initiative aimed at strengthening students' awareness and responsibility toward environmental conservation through direct planting activities. The program targeted first-grade students of MI Al-Ma'arif 02 Singosari and was developed based on the initial survey results indicating that environmental-based learning and character education activities at the school had not been optimally integrated into practical learning experiences. Therefore, the program was designed to introduce students to simple horticultural cultivation practices while simultaneously fostering environmental care and responsibility from an early age.

The implementation process involved several stages, including coordination with school representatives, preparation of educational materials and planting kits, and organization of student activities. The school actively supported the program by providing facilities, coordinating teachers, and assisting students throughout the activities. During the implementation, students received planting kits consisting of seeds, small pots, planting media, and child-friendly planting tools. More than 100 planting kits were distributed to all participating first-grade students. The activity began with interactive educational sessions regarding environmental conservation, followed by direct planting practices conducted in groups under the guidance of university students and teachers. Students demonstrated high enthusiasm and curiosity throughout the activity, indicating strong engagement in practice-based environmental learning. Documentation of planting class activity can be seen in Figure 6.



Figure 6. Implementation of Planting Class Activity in MI Al Ma'arif 02

The effectiveness of the Planting Class program was evaluated using pre-test and post-test assessments (Figure 7). The evaluation results showed a substantial improvement in students' understanding of environmental care and planting activities, with the average score increasing from 62.93 during the pre-test to 85.78 in the post-test, representing an improvement of approximately 46%. In addition to cognitive improvement, the program successfully established more than 100 horticultural plants that were subsequently maintained within the school greenhouse area. The results indicate that experiential learning approaches such as planting activities can effectively improve environmental literacy, practical skills, and student participation in sustainability-oriented education.

3.5 Program Sustainability, Replication Potential, and Overall Impact

The "Village Greenovation and Planting Class" program demonstrated significant impacts on community empowerment, environmental awareness, and educational development in Pagentan Village. The implementation of the community greenhouse successfully provided residents with a functional urban farming facility that supports household-scale food production and sustainable agricultural practices. More than 20 residents actively participated in greenhouse construction, hydroponic training, and maintenance activities, reflecting strong community engagement and collective responsibility toward environmental sustainability. In addition to improving technical knowledge regarding hydroponic cultivation and greenhouse management, the program also strengthened social cohesion among residents through collaborative activities such as collective construction work and shared environmental initiatives.

The sustainability aspect of the program was supported by the establishment of community participation and local commitment to continue greenhouse management after the program completion. Residents agreed to collectively maintain the greenhouse and utilize it as a shared learning and food production space. The application of low-cost and simple technologies, including hydroponic systems and compost-based planting media, increased the feasibility of long-term implementation within densely populated urban settlements. Previous studies have shown that community-based urban agriculture programs can contribute to local food resilience, environmental sustainability, and social participation when supported by collaborative management systems and practical technology transfer [11]. Another study also supports the sustainability and replication potential of community-based urban agriculture programs. Community gardening and urban farming initiatives have been reported to improve social interaction, food accessibility, environmental stewardship, and long-term community resilience in urban settlements [15].

In the educational sector, the Planting Class program successfully introduced experiential environmental learning to elementary school students through direct planting activities. More than 100 planting kits were distributed to first-grade students, and the evaluation results showed a 46% increase in students' environmental knowledge after participating in the activities. The school also demonstrated strong commitment to maintaining the planted horticultural crops and integrating environmental activities into future learning programs. This

finding aligns with previous research emphasizing that school gardening and planting-based learning activities can improve environmental literacy, responsibility, and student engagement through direct interaction with natural processes [13] [14].

Overall, the integration of community greenhouse development and school-based environmental education created multidimensional impacts involving food security, environmental awareness, social participation, and character education. The collaboration among universities, local communities, schools, and village stakeholders became an important factor supporting program implementation and sustainability. The success of this program indicates that participatory and low-cost environmental interventions can become effective community empowerment models that are potentially replicable in other densely populated urban areas facing similar environmental and food security challenges. Furthermore, the program supports the achievement of Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 4 (Quality Education), and SDG 11 (Sustainable Cities and Communities).



PRE-TEST

"Pengelolaan Sampah dan Konsep 3R"

Nama :

Jawablah pernyataan di bawah ini dengan pilihan BENAR atau SALAH sesuai dengan apa yang kalian ketahui. Berikan tanda centang (✓) pada jawaban kalian!

1. Sampah organik adalah sampah yang mudah terurai secara alami.
   ☐ BENAR ☐ SALAH
2. Reduce berarti mengurangi penggunaan barang-barang yang menghasilkan sampah.
   ☐ BENAR ☐ SALAH
3. Reuse artinya membakar sampah agar tidak menumpuk.
   ☐ BENAR ☐ SALAH
4. Botol plastik bekas tidak dapat dimanfaatkan kembali sebagai pot tanaman.
   ☐ BENAR ☐ SALAH
5. Recycle adalah proses mengubah sampah menjadi barang baru yang bermanfaat.
   ☐ BENAR ☐ SALAH
6. Semua jenis sampah bisa didaur ulang tanpa perlu dipilah.
   ☐ BENAR ☐ SALAH
7. Mengurangi penggunaan kantong plastik adalah salah satu contoh dari prinsip Reduce.
   ☐ BENAR ☐ SALAH



POST-TEST

"Pengelolaan Sampah dan Konsep 3R"

Nama :

Jawablah pertanyaan di bawah ini dengan memberikan tanda centang (X) pada jawaban yang benar!

1. Apa yang di maksud dengan sampah organik?
   A. Sampah yang tidak bisa di urai dan berbahaya
   B. Sampah yang mudah terurai secara alami
   C. Sampah dari logam dan plastik
2. Apa arti dari prinsip *Reduce* dalam pengelolaan sampah?
   A. Mengumpulkan sampah sebanyak mungkin
   B. Menggunakan kembali barang yang sudah dipakai
   C. Mengurangi penggunaan barang-barang yang menghasilkan sampah
3. Apa arti dari prinsip *Reuse*?
   A. Menggunakan kembali barang – barang yang masih bisa di pakai
   B. Membakar sampah agar tidak menumpuk
   C. Menyimpan sampah di dalam tanah
4. Apa yang kamu bisa lakukan jika memiliki botol plastik bekas sesuai konsep 3R?
   A. Dibuang ke sungai
   B. Dapat dijadikan pot tanaman atau kerajinan
   C. Dibakar agar tidak menumpuk banyak
5. Apa yang dimaksud dengan prinsip *Recycle*?
   A. Menggunakan barang baru agar bersih
   B. Mengubah sampah menjadi barang baru yang bermanfaat
   C. Mencampur semua sampah agar cepat terurai
6. Agar memudahkan sampah dapat di daur ulang, maka harus…
   A. Dibakar
   B. Ditimbun tanah
   C. Dipilah
7. Mengurangi penggunaan kantong plastik adalah salah satu contoh dari prinsip…



Figure 7. Assesment Tool and Average Pre- and Post-Test Results of Planting Class in MI Almaarif 02 Singosari

The findings of this program are consistent with previous studies emphasizing that school gardening and planting-based learning activities contribute significantly to children's environmental awareness, responsibility, and character development. Hands-on environmental education has been reported to improve student engagement because learners directly interact with natural processes and gain meaningful learning

experiences [13]. Furthermore, school gardening programs can strengthen interdisciplinary learning by integrating science, environmental education, and social values within practical activities [14]. Therefore, the Planting Class program not only fulfilled its educational objectives but also demonstrated the potential for long-term integration into school-based environmental education programs.

4. CONCLUSION

The program successfully addressed environmental and food security challenges in Pagentan Village through community-based greenhouse development and environmental education for elementary school students. Participatory collaboration among residents, schools, university students, and local stakeholders effectively improved environmental awareness, sustainable farming skills, and social engagement. The greenhouse development and hydroponic training enhanced residents' knowledge and practical abilities in urban farming, while the Planting Class activities improved students' environmental literacy and responsibility through experiential learning. Overall, the program optimized limited land use, strengthened local food resilience, and promoted sustainable community participation. The use of simple and adaptable technologies also indicates strong potential for long-term sustainability and replication in other urban communities.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the Community Service Grant Program (Hibah Pengabdian kepada Masyarakat) DRPM Universitas Brawijaya 2025 for the financial support provided under Contract No. 00848.10/UN10.A0501/B/PT.01.03.2/2025.

The authors also extend their appreciation to all members of Group 22 Mahasiswa Membangun Desa (MMD) Universitas Brawijaya 2025 for their active participation, dedication, and contribution throughout the implementation of the program.

Special thanks are addressed to the community partners of RT 06 RW 04 Pagentan Village and MI Almaarif 02 Singosari, Malang Regency, for their collaboration, support, and enthusiastic involvement in all program activities. Their participation and commitment were essential to the successful implementation and sustainability of this community empowerment and environmental education program.

DAFTAR PUSTAKA

[1] T. Firman, "Major issues in Indonesia's urban land development," Land Use Policy, vol. 21, no. 4, 2004. https://doi.org/10.1016/j.landusepol.2003.04.002

[2] C. Cao and J. Wang, "The impact of urban expansion on food production: A bibliometric study of development, hotspots, and future prospects," Frontiers in Sustainable Food Systems, vol. 9, p. 1550373, 2025. https://doi.org/10.3389/fsufs.2025.1550373

[3] J. Sastradiharja, "Implementasi pendidikan lingkungan hidup untuk meningkatkan kebiasaan hidup bersih dan sehat pada anak usia dini," Universitas PTIQ Jakarta, vol. 8, no. 5, pp. 945–956, 2024. https://doi.org/10.31004/obsesi.v8i5.6107

[4] L. Magalhaes and A. D. Hartanto, "Model pemberdayaan berbasis pemanfaatan sumberdaya alam berkelanjutan: Studi pada program energi terbarukan di Kabupaten Jombang," JDEP, vol. 3, no. 1, pp. 39–51, 2020. https://doi.org/10.33005/jdep.v3i1.104

[5] H. Ohly, S. Gentry, R. Wigglesworth, A. Bethel, R. Lovell, and R. Garside, "A systematic review of the health and well-being impacts of school gardening: Synthesis of quantitative and qualitative evidence," BMC Public Health, vol. 16, no. 1, p. 286, 2016. https://doi.org/10.1186/s12889-016-2941-0

[6] I. Moridu, A. Purwanti, M. Melinda, R. F. Sidik, and A. Asfahani, "Edukasi keberlanjutan lingkungan melalui program komunitas hijau untuk menginspirasi aksi bersama," Community Development Journal: Jurnal Pengabdian Masyarakat, vol. 4, no. 4, pp. 7121–7128, 2023. https://doi.org/10.31004/cdj.v4i4.18699

[7] Food and Agriculture Organization (FAO), Urban Agriculture for Sustainable Poverty Alleviation and Food Security. Rome, Italy: FAO, 2008.

[8] R. T. Ilieva, A. McPhearson, S. L. Bohn, and T. Kremer, "The socio-cultural benefits of urban agriculture: A review of the literature," Land, vol. 11, no. 5, p. 622, 2022. https://doi.org/10.3390/land11050622

[9] E. J. Ozer, "The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development," Health Education & Behavior, vol. 34, no. 6, pp. 846–863, 2007. https://doi.org/10.1177/1090198106289002

[10] J. R. Taylor and S. T. Lovell, "Urban home food gardens in the Global North: Research traditions and future directions," Agriculture and Human Values, vol. 31, pp. 285–305, 2014. https://doi.org/10.1007/s10460-013-9475-1

[11] Food and Agriculture Organization (FAO), The Place of Urban and Peri-Urban Agriculture (UPA) in National Food Security Programmes. Rome, Italy: FAO, 2011.

[12] N. Sharma, S. Acharya, K. Kumar, N. Singh, and O. P. Chaurasia, "Hydroponics as an advanced technique for vegetable production: An overview," Journal of Soil and Water Conservation, vol. 17, no. 4, pp. 364–371, 2018. https://doi.org/10.5958/2455-7145.2018.00056.5

[13] D. Blair, "The child in the garden: An evaluative review of the benefits of school gardening," The Journal of Environmental Education, vol. 40, no. 2, pp. 15–38, 2009. https://doi.org/10.3200/JOEE.40.2.15-38

[14] D. R. Williams and P. S. Dixon, "Impact of garden-based learning on academic outcomes in schools: Synthesis of research between 1990 and 2010," Review of Educational Research, vol. 83, no. 2, pp. 211–235, 2013. https://doi.org/10.3102/0034654313475824

[15] H. A. Okvat and A. J. Zautra, "Community gardening: A parsimonious path to individual, community, and environmental resilience," American Journal of Community Psychology, vol. 47, no. 3–4, pp. 374–387, 2011. https://doi.org/10.1007/s10464-010-9404-z