

Strengthening Family Food Security through the Utilization of Home Gardens Based on Seedlings and PSB Liquid Organic Fertilizer

Anugrahita Melinia Trihaksami^{1*}, Yuli Setiowati², Primadiyanti Arsela³, Nuraini⁴, Riska⁵

¹ Universitas Muhammadiyah Kalimantan Timur, Indonesia, amt545@umkt.ac.id

² Universitas Muhammadiyah Kalimantan Timur, Indonesia, ys178@umkt.ac.id

³ Universitas Muhammadiyah Kalimantan Timur, Indonesia, pa465@umkt.ac.id

⁴ Universitas Muhammadiyah Kalimantan Timur, Indonesia, nur849@umkt.ac.id

⁵ Universitas Muhammadiyah Kalimantan Timur, Indonesia, rizka0044@gmail.com

ARTICLE INFO

Article History:

Received February 25, 2026

Accepted March 20, 2026

Available online April 25, 2026

Kata Kunci:

Ketahanan Pangan Keluarga,
Rumah Bibit, Pekarangan, Pupuk
Organik Cair PSB

Keywords:

Family Food Security, Seed
Houses, Yards, PSB Liquid Organic
Fertilizer

This is an open access article under the
[CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright ©2026 by Author. Published
by Institute of Education and Social
Research

ABSTRAK

Ketahanan pangan keluarga sangat penting dalam meningkatkan kesejahteraan masyarakat dan kualitas hidup mereka, terutama di daerah pedesaan yang bergantung pada sumber daya lokal. Tujuan dari kegiatan pengabdian kepada masyarakat ini adalah untuk meningkatkan kesadaran masyarakat serta meningkatkan kemandirian mereka dalam mewujudkan ketahanan pangan keluarga dengan mengoptimalkan pemanfaatan lahan pekarangan. Kegiatan Pengabdian kepada masyarakat ini dilaksanakan di Desa Tanah Periuk, Kecamatan Tanah Grogot, Kabupaten Paser, pada bulan September 2025. Metode pelaksanaan menggunakan pendekatan partisipatif yaitu mencakup kegiatan sosialisasi, pembuatan demplot rumah bibit berbasis pekarangan, serta pelatihan pembuatan pupuk organik cair berbasis bakteri fotosintetik (Photosynthetic Bacteria/PSB). Untuk mengukur efektivitas kegiatan dilakukan pretest dan posttest terhadap 45 peserta. Hasil pretest menunjukkan bahwa skor rata-rata pengetahuan peserta meningkat dari 58 (kategori kurang) menjadi 87 (kategori baik), atau terjadi peningkatan sebesar 50%. Sebanyak 87% peserta menyatakan memahami materi dengan baik dan 93% peserta menyatakan tertarik untuk menerapkan ilmu yang didapat di pekarangan rumah mereka. Hasil ini menunjukkan bahwa kegiatan pengabdian yang dilaksanakan efektif dalam meningkatkan pengetahuan dan kesadaran masyarakat serta mendorong pemanfaatan pekarangan secara produktif dan berkelanjutan.

ABSTRACT

Family food security is very important in improving the welfare of the community and their quality of life, especially in rural areas that depend on local resources. The purpose of this community service activity is to increase public awareness and improve their independence in achieving family food security by optimizing the use of yard space. This community service activity was carried out in Tanah Periuk Village, Tanah Grogot District, Paser Regency, in September 2025. The implementation method used a participatory approach, which included socialization activities, the creation of a yard-based seedling demonstration plot, and training in the production of liquid organic fertilizer based on photosynthetic bacteria (PSB). To measure the effectiveness of the activity, a pretest and posttest were conducted on 45 participants. The pretest results showed that the average knowledge score of the participants increased from 58 (poor category) to 87 (good category), or an increase of 50%. A total of 87% of participants stated that they understood the material well, and 93% of participants stated that they were interested in

applying the knowledge they had gained in their home gardens. These results show that the community service activities carried out were effective in increasing community knowledge and awareness and encouraging the productive and sustainable use of home gardens.

INTRODUCTION

In order to achieve community welfare, household food security is crucial, particularly in rural settings where nutritional demands are met by local resources. The availability, access, and usage of enough wholesome, safe, and reasonably priced food for every member of the family without reliance on erratic outside sources is referred to as household food security (Rijal et al., 2024). In this regard, a key component of advancing the welfare of rural communities is each family's capacity to independently guarantee food availability.

Many rural communities in Indonesia, including Paser Regency, continue to face challenges such as inadequate access to nutritious food and inefficient use of yard space in people's homes as a source of local food. Home gardens are strategic assets that, if maintained effectively, can offer families with vegetables, fruits, and other nutritional crops while raising household income through the sale of local produce (Setiawan et al., 2025). This emphasizes the need of community empowerment programs as a method for maximizing the potential of home gardens as a long-term source of food for families.

Tanah Periuk Village, located in Tanah Grogot Subdistrict, Paser Regency, East Kalimantan Province, is a rural settlement with agrarian features. The population largely resides in a lowland area of around 6.74 km². The potential of home gardens in this village can still be realized, but challenges such as technical understanding of cultivation and the use of environmentally friendly agricultural inputs must be addressed through educational and participatory programs so that local families can improve their food security in a sustainable manner.

One effective empowerment approach is through the development of backyard vegetable nurseries, where communities are involved in sowing and planting nutritious food crops for family consumption and small business development. The use of home gardens as food production areas has been proven to increase the understanding and skills of household farmers in growing vegetables, fruits, and other food crops, even though the available land is limited (Soemarah et al., 2023). Such activities not only facilitate the availability of local food but also increase family involvement in household agricultural activities. The utilization of home gardens can reduce household food expenditures while supporting local food security (Suardi et al., 2020).

Furthermore, incorporating photosynthetic bacteria (PSB)-based liquid organic fertilizer technology into environmentally friendly cultivation practices can improve soil fertility and crop productivity without relying on chemical fertilizers, which are costly and hazardous to human health and the environment. Studies show that the application of photosynthetic bacteria can improve plant growth and growing medium quality through biological mechanisms that support the sustainability of horticultural crop production (Sa'diyah & mutiati, 2024). This approach also educates the community about cost-effective and environmentally friendly alternative agricultural inputs, thereby supporting a more robust model of family food security.

As a result, a complete community empowerment program is required to promote knowledge, skills, and active community participation in using home gardens through a seedling house method, food crop production, and the use of PSB liquid organic fertilizer. As a result, families in villages like Tanah Periuk can not only fulfill their own food needs, but they also have the abilities to improve their family's economic well-being on their own and over time.

MATERIALS AND METHODS

This community service project was carried out in the KKN program, also known as the Community Service Learning Program, through a participative and integrated approach. The activity involved interaction with the community, the building of seedling demonstration plots in residents' yards, and training and direct experience in manufacturing PSB liquid organic fertilizer from materials readily available in the surrounding environment.

To assess the participants' comprehension, a pretest was administered prior to the activity, followed by a posttest once the entire set of exercises had been completed. The collected data was examined descriptively and quantitatively using percentages to determine the change in the community's awareness of family food security. The stages of implementation include:

1. Preparation and Socialization Stage

The dissemination emphasized that the use of organic materials is in line with national policies in supporting sustainable agriculture programs, which aim to reduce dependence on chemical or inorganic fertilizers (Rolando Fole et al., 2024). This step begins with collaboration among the village head, village authorities, and community leaders to describe the program plan and request assistance. A site survey is then conducted to establish the most strategic and accessible location for the seedling house. Needs are assessed through interviews and focus group discussions (FGD) to establish the sorts of vegetables in demand as well as the challenges encountered. The program is disseminated through a meeting at the village hall attended by 45 members of various community groups.

2. Infrastructure Development Stage

The seedling house construction was constructed by mutual cooperation, with locally available materials such as bamboo for the frame and UV-resistant plastic for the roof. The seedling home measures 6 by 4 meters in size and stands 2.5 meters tall. The shelves are four-tiered and have a total capacity of 500 polybags. To assist watering, a simple drip irrigation system is created that includes PVC pipes and hoses. Planting medium is obtained in the form of a 2:1:1 combination of soil, compost, and burnt husks, as well as cultivation equipment such as mini hoes, sprayers, and sowing tools.

3. Training and Mentoring Stage

- a. Conducted organic vegetable cultivation instruction for 45 participants, including women from the Family Welfare Empowerment program, farmer group members, and village youth. The training material covered: (a) selecting quality seeds and seed treatment before sowing, (b) proper sowing techniques using seed trays, (c) making organic planting media from local materials, (d) transferring seedlings to polybags and planting them in the field, (e) plant maintenance including watering, organic fertilization, and weeding, (f) pest and disease control using organic pesticides made from natural ingredients such as mimba leaves and garlic, and (g) harvest. Every day, participants received intensive coaching to guarantee successful knowledge transfer and quick practice.
- b. Conducted training on the production of Photosynthetic Bacterial Liquid Organic Fertilizer (POC PSB), 45 participants attended, including women from the Family Welfare Empowerment program, farmers, and village youth. The training content covered: (a) Preparation of Nutrient Media (Stock Solution). Three eggs were broken and beaten uniformly. MSG (1 teaspoon) and oyster sauce (1 teaspoon) were mixed in the beaten eggs

until completely combined. (b) Mixing: The stock solution is combined with pond water. Pond/rice field water is ideal because it includes natural PSB, which serves as an initial inoculum. (c) Packaging and Inoculation: Pour the solution into clear bottles until 3/4 full. This vacant space is critical for achieving the micro-anaerobic conditions desired by PSB. If you're using a starter, add 5 ml to each bottle before closing tightly. (d) Activation and Monitoring: The bottles are tightly sealed, shaken, and arranged in rows in an open area with direct sunshine (full daylight). Members of the farmer group are tasked for shaking the bottles at least once a day and recording color changes to indicate activation. PSB is a photosynthetic microorganism that plays a role in improving soil fertility, stimulating plant growth, and strengthening plant resistance to disease (Ekajayanti Kining et al., 2024).

4. Seed Production and Distribution Stage

Begin growing seeds for the community's most popular veggies, such as kale, mustard greens, spinach, chili peppers, and tomatoes. To maintain a consistent supply of seeds, seedling cultivation is done in phases utilizing a rolling method once a week. Prospective seed recipients are registered, with priority given to low-income families and active training participants. Seed distribution is free of charge in the early stages as a stimulus, provided that recipients are prepared to care for the seeds until harvest and report the results. Each family receives 15-20 mixed seeds, based on the size of their yard.

RESULTS

The organic vegetable cultivation extension program was conducted over two days with a total duration of 12 hours. The first day focused on theoretical instruction and demonstrations of seedling techniques, while the second day emphasized hands-on practice in vegetable seedling production and Training on the Production of Liquid Organic Fertilizer Based on Photosynthetic Bacteria (PSB). A total of 45 participants attended the program, consisting of 7 village adolescents (16%), 10 farmer group members (22%), and 28 members of the Family Welfare Empowerment (PKK) group (62%). The dominance of female participants highlights the important role of women in household food management and family nutrition. The training method combined lectures, demonstrations, and practical sessions in a 30:30:40 ratio. In addition, each participant received an illustrated training module to support independent practice at home.



Figure 1. Socialization activities

Training effectiveness was evaluated using pre-test and post-test assessments. The average participant score increased from 58 (low category) to 87 (good category), representing a 50% improvement in knowledge. Furthermore, 87% of participants reported that they understood the training materials well, while 93% expressed interest in applying organic vegetable cultivation practices in their home gardens.



Figure 2. Process of producing liquid organic fertilizer using Photosynthetic Bacteria

During the five-week implementation period, the seedling house successfully produced more than 1,200 vegetable seedlings, which were distributed to 65 households in Tanah Periuk Village. Seedling production was carried out gradually using a weekly rolling system. Kale and spinach were cultivated during the first week, mustard greens during the second week, and chili peppers and tomatoes during the third and fourth weeks.



Figure 3. Location of seedling house construction

The distribution system prioritized 25 underprivileged households that received seedlings free of charge, 30 active training participants who obtained subsidized seedlings at IDR 500 per seedling, and 10 general households that purchased seedlings at IDR 1,000 per seedling. Revenue generated from seedling sales was allocated to operational expenses, including seed procurement, fertilizer purchases, and facility maintenance. Each household received

approximately 15–20 mixed vegetable seedlings adjusted to yard size and household needs. Such activities not only facilitate the availability of local food but also increase family involvement in household agricultural activities (Susanti & Purwandari, 2022).

Tabel 1 presents the level of community participation in each stage of the program implementation, including program socialization, seedling house construction, cultivation training, seedling distribution, and the establishment of management groups. The data indicate varying levels of participation across activities, reflecting the community's engagement and contribution to the sustainability of the organic vegetable cultivation program.

Table 1. Community Participation in the Program

Activity	Number of Participants	Percentage
Program Socialization	45 people	100%
Seedling House Construction	25 people	55.6%
Cultivation Training	45 people	100%
Seedling Recipients	65 households	144.4%
Management Groups	12 groups	-

Source: Primary Data, 2025.

Percentages were calculated based on the total number of participants attending the program socialization activities (45 participants). Data on seedling recipients and management groups are presented in household and group units, respectively.

Based on post-distribution monitoring conducted on 65 recipient households, 78% of households successfully harvested vegetables within 30–60 days after planting. On average, households were able to fulfill approximately 40–50% of their daily vegetable needs through home garden production. This contributed to reduced household expenditures on vegetables while simultaneously increasing the frequency of vegetable consumption, particularly among children.

DISCUSSION

The significant improvement in participant knowledge following the training demonstrates the effectiveness of the extension methods employed in this program. The integration of lectures, demonstrations, and practical activities provided participants with a more comprehensive learning experience, particularly for community members with limited prior knowledge of organic cultivation techniques. The use of illustrated modules further enhanced participants' ability to independently replicate the practices after the program ended.

The high participation rate among PKK women indicates the strategic role of women in strengthening household food security. Women generally play a central role in food preparation and nutritional management within families; therefore, enhancing their agricultural knowledge and skills can directly contribute to improving family dietary quality and nutritional resilience.

The gradual seedling production system using a rolling schedule proved effective in maintaining a continuous supply of seedlings. The selection of vegetable types based on harvest duration also provided practical benefits for the community. Fast-growing leafy vegetables such as kale and spinach enabled households to obtain food sources within a short period, while chili

peppers and tomatoes offered higher economic value and the potential to increase household income.

Participants showed strong interest in the production of liquid organic fertilizer (POC), reflecting increasing community awareness regarding the utilization of local resources for sustainable agriculture. According to (Pitaloka et al., 2022), liquid organic fertilizer contains high nitrogen levels that support optimal plant growth. The activity not only improved participants' technical skills but also strengthened farmer independence by reducing dependence on chemical fertilizers.

The success of 78% of households in harvesting vegetables demonstrates the considerable potential of home gardens to enhance household food security and nutrition. The ability to meet up to 50% of daily vegetable needs through self-production may reduce household food expenditures while promoting healthier dietary patterns. These findings indicate that the seedling house program generated not only economic benefits but also social and public health impacts for the community. Home gardens are strategic assets that can support household food independence and improve family welfare (Alrasyid et al., 2022)

Several challenges emerged during program implementation, including limited initial community knowledge, pest attacks during the early seedling phase, and constraints in mentoring time. To address these challenges, the program provided simplified illustrated modules, promoted the use of locally sourced organic pesticides, and collaborated with experienced farmer groups to ensure continued assistance after the completion of the community service activities.

Program sustainability was strengthened through the establishment of 12 seedling management groups that participated in a three-day nursery management training program. The training covered technical production skills, basic financial management, marketing strategies, and community communication. In addition, the preparation of a six-month Work Plan and Budget (RKA) represented an important step toward ensuring the long-term sustainability of the seedling house operations. This finding aligns with the community empowerment concept proposed by (Hakim & Lubis, 2022), which emphasizes that sustainable community programs must be adaptive to social, economic, and environmental dynamics.

CONCLUSION

The organic vegetable cultivation extension program and seedling house management initiative implemented in Tanah Periuk Village successfully improved community knowledge and skills in home-based vegetable cultivation. This was demonstrated by the increase in participants' average scores from 58 to 87 after the training, as well as the high level of interest among participants in applying the acquired knowledge independently. The program also succeeded in producing more than 1,200 vegetable seedlings distributed to 65 households, thereby supporting household vegetable self-sufficiency.

The implementation of a gradual seedling production system and training on the production of Photosynthetic Bacteria (PSB)-based liquid organic fertilizer demonstrated strong potential for supporting sustainable household agriculture. The success of 78% of recipient households in harvesting vegetables from their home gardens indicates that the program not only provided economic benefits through reduced food expenditures, but also contributed to improving household food security and nutritional quality.

Despite several challenges, including limited initial community knowledge and pest attacks during the early seedling phase, the program was effectively implemented through continuous assistance, the use of locally sourced organic pesticides, and the establishment of

seedling management groups. Therefore, the community-based seedling house program has significant potential to be further developed as a sustainable model for strengthening household food security and promoting community-based organic agriculture.

ACKNOWLEDGE

The author would like to express his gratitude to Muhammadiyah University of East Kalimantan, the Tanah Periuk Village Government, especially the Village Head and all village officials who have provided full support, facilities, and convenience in the implementation of the program from the preparation stage to the evaluation stage.

High appreciation is given to the people of Tanah Periuk Village who have actively and enthusiastically participated in the entire series of activities. Thank you to the women of the Family Empowerment and Welfare group, the farmer group, and the village youth who took the time to participate in the training and work together to build the seedling house. Special recognition is given to the Sejahtera Tanah Periuk Farmer Group for agreeing to manage the seedling house for the sustainability of the program.

REFERENCES

- Alrasyid, R. P. D., Sholikhah, R., Hidayah, U. N., Agatta, S. K. D., Putri, A. Q., & Abbas, M. H. I. (2022). Pemberdayaan masyarakat dalam memanfaatkan lahan pekarangan melalui Program Kawasan Rumah Pangan Lestari (KRPL). *JPPM (Jurnal Pengabdian Dan Pemberdayaan Masyarakat)*, 317–323.
- Hakim, L., & Lubis, M. D. A. (2022). Program Pengembangan Masyarakat: Evaluasi Efektivitas dan Keberlanjutannya di Era Modern. *Jurnal Cahaya Mandalika ISSN 2721-4796 (Online)*, 3(3), 2048–2055.
- Pembuatan Pupuk Organik Cair Berbasis Bakteri Fotosintetik bagi Kelompok Tani di Kabupaten Enrekang Ekajayanti Kining, P., Achyar Ardat, M., Astari Rusdin, R., Assidiq, I., Badi, M., Studi Biokewirausahaan, P., Studi Agroteknologi, P., & Studi, P. (2024). Pelatihan Pembuatan Pupuk Organik Cair Berbasis Bakteri Fotosintetik (PSB) bagi Kelompok Tani di Kabupaten Enrekang. *Jurnal Pengabdian UNDIKMA*, 5(4), 662–671.
- Pitaloka, D., Abidin, Z., Pratiwi, A. H., Hakim, A. L., Handayani, S., Muradillo, A., & Agroteknologi, D. P. (2022). Pemanfaatan Limbah Cucian Beras Sebagai Pupuk Organik Cair (POC) Mendukung Ketahanan Pangan di Desa Mojosari, Kepanjen, Kabupaten Malang. *I-Com: Indonesian Community Journal*, 2(3), 652–657.
- Rijal, M., Euriga, E., & Nurlaela, S. (2024). Motivasi Petani dalam Pemanfaatan Lahan Pekarangan Kelompok Wanita Tani di Kalurahan Potorono Kapanewon Banguntapan Kabupaten Bantul. *Jurnal Ilmu-Ilmu Pertanian*, 31(1), 36–42.
- Rolando Fole, F., Goreti Soli, M., Nenu, E., Mamo, Y., Wani, B., Kurnia Juita, A., Xaverius Dolo, F., Citra Bakti, S., & artikel Abstrak, H. (2024). Penerapan pupuk organik cair YGO melalui penyuluhan untuk meningkatkan produksi padi di Desa Libunio. *Jurnal Citra Kuliah Kerja Nyata*, 2(4), 263–270.
- Sa'diyah, H., & mutiati, enni. (2024). The Effect of Photosynthetic Bacteria (PSB) in Soil and Biochar Planting Media on the Growth of Water Spinach Plants. *Bioconsortium: Biological Research and Education*, 1(1), 05–08.
- Setiawan, R., Fatah, M. S., & Naldi, R. R. (2025). Pemberdayaan Dan Pendampingan Masyarakat Melalui Budidaya Sayuran Organik Berbasis Pekarangan Rumah Sebagai Strategi Ketahanan Pangan Keluarga Di Pedesaan. *Kreativitas Pada Pengabdian Masyarakat (Krepa)*, 7(1), 151–160.
- Soemarah, T. K., Suprpti, E., Budiyono, A., & Tunas Pembangunan Surakarta, U. (2023). Pendampingan Pemanfaatan Lahan Pekarangan Untuk Mendukung Ketahanan Pangan Di Desa Triyagan. *Ganesha: Jurnal Pengabdian Masyarakat*, 3(1), 59–64.

- Suardi, S., Sahputra, N., & Sumekar, A. (2020). Peningkatan Pengetahuan Keluarga Nelayan Melalui Pemanfaatan Lahan Pekarangan Sebagai Solusi Mengurangi Beban Belanja Rumah Tangga Dikampung Nelayan Indah. *Reswara: Jurnal Pengabdian Kepada Masyarakat*, 1(1), 38–46.
- Susanti, R., & Purwandari, S. (2022). Mentoring Women's Farmer Groups in Utilizing Yard Land as an Effort for Food Security in the Pandemic Period. *BEMAS: Jurnal Bermasyarakat*, 2(2), 94–103.