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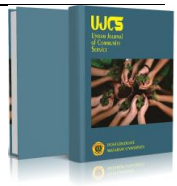

Optimising the Use of Backyard Land to Build the Socio-Economic Resilience of the Community in Gunungsari Village, West Lombok Regency

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Abstract: Limited access to economic resources and high levels of social vulnerability among rural communities necessitate empowerment strategies focused on the sustainable utilisation of local potential. This community service initiative is designed to optimise the use of backyard land as a means of strengthening the socio-economic resilience of the community in Gunungsari Village, West Lombok Regency. The programme is also aimed at supporting the fulfilment of nutritional needs and increasing household income, whilst simultaneously enhancing aesthetic value through the creation of a pleasant, cool, healthy and comfortable environment, and contributing as a means of physical activity to improve fitness and physical resilience. The programme is implemented using a participatory approach comprising the stages of needs identification, extension, technical cultivation training, mentoring, and sustainability evaluation. This activity involves 16 participants from the local community, supported by four lecturers from the Biology Education Study Programme at the Faculty of Teacher Training and Education, Mataram University. The crops developed include Capsicum annuum, Solanum melongena, Amaranthus sp., and Ocimum sp., utilising vertical farming models, pot cultivation, raised bed systems, and integrated fish farming through the rearing of catfish in buckets (budikdamber). The results of the implementation demonstrated an increase in participants' knowledge and skills in the integrated management of crop and fish cultivation. The optimisation of backyards contributes to improved household food availability and opens up additional income opportunities. Socially, this activity promotes the strengthening of interaction, collaboration, and collective awareness within the community regarding the urgency of family-based food security as the foundation for sustainable socio-economic development.

Keywords: Agriculture, Economic Resilience, Home Gardens, Community Empowerment.

Introduction

The socio-economic resilience of rural communities remains a strategic issue in sustainable development (Arifin et al., 2019). Limited access to economic resources and high levels of social vulnerability result in low food security and reduced family adaptive capacity in the face of climate change and price fluctuations. Optimising the use of backyard land through home garden systems has proven to be an effective strategy for strengthening food security and increasing household income (Galhena et al., 2016). Ecologically, home gardens constitute micro-agroecosystems that support the provision of fresh food, horticultural crops, and medicinal plants, whilst contributing to food diversification and the conservation of biodiversity (Food and Agriculture Organization, 2017; Agricultural Research and Development Agency, 2019). Various studies indicate that home garden systems improve access to nutritious food and the

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quality of household consumption (Galhena et al., 2013; Food and Agriculture Organization, 2017). In Indonesia, the concept of the Sustainable Food Home Garden Area (KRPL) has proven to strengthen household food security and reduce food expenditure (Ministry of Agriculture of the Republic of Indonesia, 2020).

In addition to meeting nutritional needs, home gardens contribute to economic growth through the marketing of surplus produce (Sibhatu & Qaim, 2018; Food and Agriculture Organization, 2017) and are positively correlated with food diversity and the economic stability of small households (Waha et al., 2018). Gardening activities also have an impact on physical and mental health as a form of green exercise (Soga et al., 2017; World Health Organization, 2020), whilst improving the quality of the microenvironment (Lin et al., 2015; United Nations Environment Programme, 2019). Family involvement in backyard management helps to strengthen social capital and the educational value of food self-reliance (Food and Agriculture Organization, 2017; Ministry of Agriculture of the Republic of Indonesia, 2020).

This situation is relevant to Kapek Atas hamlet, Gunungsari village, West Lombok regency, where backyard plots are not yet being utilised to their full potential, despite their potential to produce economically valuable commodities. The main constraints include limited knowledge, agricultural literacy, technical support, as well as access to training and marketing (Food and Agriculture Organization, 2017; Wulandari et al., 2020; Sibhatu & Qaim, 2018).

This programme is designed to provide both conceptual understanding and practical skills regarding the benefits and techniques of backyard farming, such as seasonal planting planning, the preparation of organic growing media, the use of household waste as compost, and simple harvesting and post-harvest strategies. Participatory and field-based training models have been shown to significantly increase the adoption rate of household agricultural innovations (Food and Agriculture Organization, 2021). Through this approach, backyard management is understood not merely as a subsistence activity, but as part of a strategy to strengthen the socio-economic resilience of rural communities, enabling them to adapt to economic pressures and environmental changes (Organisation for Economic Co-operation and Development, 2020). Therefore, empowerment based on capacity building, awareness raising, and the strengthening of technical skills is a strategic step towards promoting food self-sufficiency, improving the quality of the settlement environment, and strengthening the socio-economic resilience of villages in a sustainable manner (United Nations Development Programme, 2018; World Bank, 2019).

Method

The implementation of the aquaculture training programme is carried out through stages of extension, training and mentoring, applying an andragogical approach as a method of adult learning. This approach emphasises the active participation of participants through group work, field demonstrations and interactive discussions. Each participant is encouraged to independently seek out information, share experiences and be directly involved in the entire series of training activities. This is based on the principle that a comprehensive understanding of the technical and managerial aspects of a business can only be achieved through a dialogical and participatory teaching-learning process.

The learning composition in this activity is designed proportionally, with 15% theory and 85% practice, to ensure participants acquire applicable and contextually relevant technical skills in line with field requirements. The programme ran for six months, involving four supervising lecturers from the Faculty of Teacher Training and Education, Mataram University, and sixteen participants from the village where the activities took place. Operationally, this community service programme consisted of two main phases: the preparation phase and the implementation phase. During the implementation phase, there were three main types of activities: (1) extension sessions as a means of delivering technical guidance on farming, (2) hands-on cultivation practice on participants' home plots, and (3) ongoing mentoring to ensure the sustained application of skills and to address technical challenges faced by participants in the field. The programme content covers strengthening socio-economic resilience through the use of home gardens as productive spaces, introducing various simple and adaptive forms of cultivation suited to garden conditions, and understanding the ecological, economic, and health benefits that can be derived from these cultivation practices.

Results and Discussion

In line with the objectives of developing backyard farming, this initiative is designed to support household economic growth whilst ensuring the sustainable fulfilment of the family's nutritional needs. In addition to serving as a source of food and supplementary income, farming activities also act as a means of physical activity that can improve the vitality, fitness and physical resilience of family members. Furthermore, the productive and well-organised management of backyards helps to create a more beautiful, cool,

comfortable, healthy and pleasant living environment. In this regard, the following outlines the series of activities that have been carried out.

Proper preparation of growing media

Proper preparation of growing media is not only aimed at achieving optimal plant growth in the short term, but also at ensuring the long-term sustainability of soil fertility. From an agroecological perspective, soil is viewed as a living system characterised by complex interactions between its physical, chemical and biological components. Therefore, proper management of growing media must prioritise increasing organic matter content as the key factor in maintaining soil aggregate stability, cation exchange capacity (CEC), and the activity of soil microorganisms involved in nutrient cycling (Food and Agriculture Organization, 2017; Lal, 2020).

The addition of organic matter such as compost and manure has been shown to improve soil structure through the formation of more stable aggregates, thereby enhancing soil porosity and water-holding capacity. This is particularly important in home garden cultivation, which typically has limited space and is often subject to physical disturbance due to domestic activities (Blanco-Canqui & Ruis, 2018). Furthermore, organic matter serves as an energy source for soil microbes involved in the decomposition and mineralisation of nutrients, thereby naturally increasing the availability of nitrogen, phosphorus, and potassium (Lori et al., 2017).

Soil chemistry is also a key consideration in preparing growing media. An ideal soil pH (around 5.5–6.8 for most horticultural crops) ensures nutrients are available in a form readily absorbed by roots. Soil that is too acidic or too alkaline can inhibit the uptake of certain nutrients and reduce the efficiency of fertilisation (Food and Agriculture Organization, 2021). Therefore, simple testing of soil pH and the addition of soil conditioners such as dolomite lime or organic matter are an important part of the growing medium preparation stage.

From a biological perspective, the presence of soil microorganisms such as phosphate-solubilising bacteria, mycorrhizal fungi and actinomycetes makes a significant contribution to improving nutrient uptake efficiency and plant resilience to environmental stress (Begum et al., 2019). The integration of biofertilisers or biological fertilisers into home garden growing media is increasingly recommended in sustainable agricultural practices as it can boost productivity without excessive reliance on synthetic chemical fertilisers (United Nations Environment Programme, 2019).

Thus, the preparation of good-quality soil is a planned process based on scientific principles, encompassing the improvement of physical structure, soil chemical balance, and the enhancement of biological components. This approach not only improves the success of crop cultivation in home gardens but also supports the principles of environmental sustainability and long-term household food security.

Every plant has the potential to produce optimal yields when grown in high-quality growing media. Good growing media generally have a high organic matter content, a crumbly or loose structure, and the ability to retain and supply sufficient water to meet the plant's growth requirements. To achieve such characteristics, soil can be combined with manure, compost, and rice husks. A commonly used formulation is a ratio of two parts soil to one part each of manure, compost, and rice husks. However, this composition is flexible and can be adjusted according to the availability of materials. The main principle is to ensure that the addition of organic matter and rice husks is sufficient so that the growing medium has good fertility and adequate porosity to ensure optimal air circulation and root development. An illustration of the growing medium preparation process is shown below.

Figure 1. Preparation of growing medium in pots

Selecting a site with adequate sunlight exposure

Selecting a site with adequate sunlight exposure is an essential component of crop cultivation, as sunlight serves as the primary energy source for photosynthesis. Photosynthesis is the physiological mechanism by which plants convert light energy into chemical energy used for growth, tissue development and biomass production (Frontiers Media, 2025; Bantis & Koukounaras, 2023). Sunlight also influences plant organ differentiation, flower and fruit formation, and chlorophyll production, which are directly linked to the efficiency of plant metabolism in utilising environmental resources (Frontiers Media, 2025).

The duration and intensity of sunlight exposure significantly influence plant growth outcomes. Generally, plants categorised as full-sun plants require direct sunlight exposure for six to eight hours or more each day to achieve optimal growth and high yields. Plants such as tomatoes, chillies, and many fruit crops

are placed in open locations without shading to optimise this light input (Kompas, 2021; Liputan6, 2026). Meanwhile, plants that are more tolerant of shaded conditions may still grow in locations with shorter periods of sunlight, but their yield and quality will tend to be lower (Kompas, 2021; Liputan6, 2026).

In addition to duration, light intensity also determines the rate of photosynthesis and plant biomass production. Low light intensity can limit chlorophyll production and the rate of photosynthesis in plants, causing them to grow more slowly and struggle to reach their genetic potential (Simpli.com, 2023). Conversely, excessive light exposure without shade management or proper planting arrangements can also cause light stress (photoinhibition), which reduces photosynthetic efficiency and may even damage leaf tissue (University of Kebangsaan Journal, 2025).

In practical terms, selecting a planting site that receives full sunlight from morning through to midday is highly recommended for garden plants to ensure maximum photosynthesis and to keep the ambient temperature within the optimal range for growth. Morning sunlight generally provides sufficient light intensity without the risk of excessive heat, thereby supporting a balance between the plants' light requirements and heat stress (Liputan6, 2026).

Consequently, a cultivation site with adequate sunlight is a key factor in planting planning, as it plays a direct role in: increasing the rate of photosynthesis and plant biomass production, improving the efficiency of nutrient and water use by plants, and minimising the risk of low yields due to insufficient light or excessive shading.

Selecting the Right and High-Quality Cultivation Method

The selection of appropriate, high-quality crops for home gardens must be combined with the principles of organic farming in order to produce safe, healthy and sustainable produce. The success of organic vegetable cultivation depends heavily on the careful selection of plant types and varieties suited to soil conditions, sunlight intensity, water availability and the family's ability to maintain the crops. The selection of high-yielding varieties and certified seeds that have not been exposed to synthetic pesticides or hazardous chemicals is a key factor in ensuring the quality of the produce and food safety (Food and Agriculture Organization, 2017; International Seed Testing Association, 2020). Furthermore, the success of cultivation is also influenced by the natural growth processes of plants, including optimal pollination mechanisms as part of the biological cycle that supports the formation of flowers and fruit.

In backyard gardening practices, horticultural crops such as chillies and aubergines are examples of crops that are adaptable, economically valuable, and offer extensive health benefits. Chillies come in a variety of types, such as red chillies, curly chillies, green chillies, bird's eye chillies, and extremely hot varieties. The primary component of chillies is capsaicin, a bioactive compound known for its anti-inflammatory and antioxidant properties, as well as its potential as an anti-cancer agent (Batiha et al., 2020). Capsaicin is also reported to play a role in boosting metabolism, aiding weight management, improving digestion, and supporting cardiovascular health through its effects on blood lipid profiles (World Health Organization, 2020). Furthermore, the vitamin C, vitamin A, and antioxidant content in chillies contributes to boosting the immune system, eye health, and protecting cells from oxidative stress. However, chilli consumption should still be adjusted to individual tolerance to avoid stomach upset.

Meanwhile, aubergines are vegetables that are easy to grow in the garden and have high nutritional value. Various aubergine varieties, such as purple, green, white, and round aubergines, have diverse flavour and texture characteristics. Aubergines are known to have a low glycaemic index, relatively low calorie content, and high water content, making them suitable for diets and weight management. The skin of aubergines, particularly purple aubergines, contains anthocyanins such as nasunin, which act as powerful antioxidants in protecting the body's cells from damage caused by free radicals (Khan et al., 2019). Furthermore, the polyphenol content in aubergines plays a role in helping to regulate blood sugar and cholesterol levels, thereby supporting heart health (Food and Agriculture Organization, 2021). Several studies have also shown that the compound solasodine rhamnosyl glycoside in aubergines has potential as an anti-cancer agent through a mechanism of inducing apoptosis in abnormal cells.

The vitamin and mineral content of aubergines—such as vitamin A, B complex, vitamin K, potassium, iron and manganese—makes them an important staple in household food diversification. Their high dietary fibre content also helps maintain digestive health and prevent anaemia through the contribution of iron to red blood cell formation. Thus, growing chillies and aubergines in the garden not only supports household food security but also contributes to improving the family's overall nutritional quality and health.

Chillies, meanwhile, are known to have a variety of benefits, both for health and for body care. Some of the benefits of chillies include: helping to inhibit the growth of cancer cells, aiding digestion, and improving cognitive function. Furthermore, chillies can help relieve stress, prevent obesity and support weight loss, as well as play a role in the formation of red blood cells.

The active compounds in chillies have anti-inflammatory properties and can help alleviate internal heat, particularly mouth ulcers. Chillies are also

beneficial for relieving a blocked nose caused by flu or a cold, maintaining eye health, and reducing complaints such as dizziness, migraines, and headaches. Furthermore, chillies can help prevent bad breath, maintain heart health, and relieve joint pain.

Other benefits include boosting the immune system, helping to treat psoriasis or skin conditions such as itching and rashes, preventing fungal infections, and supporting the body's detoxification process. Chillies are also believed to slow down the signs of ageing, thereby helping to maintain a youthful appearance, as well as preserving the health and strength of hair. In addition to the benefits already mentioned, various scientific studies also indicate that chillies have positive effects on metabolic health and antioxidant activity. The main component of chilli, capsaicin, plays a role in boosting the body's metabolism, thereby aiding weight management and improving insulin sensitivity (Ludy & Mattes, 2011). Capsaicin has also been linked to a reduced risk of cardiovascular disease through its effects on blood pressure and blood lipid profiles (Zsiborás et al., 2018). Chilli peppers contain various antioxidants such as vitamin C and carotenoids, which help neutralise free radicals and reduce oxidative stress in the body's cells, contributing to the prevention of premature ageing and degenerative conditions (García-Santamarina et al., 2019). Furthermore, the anti-inflammatory properties of capsaicin have been studied for their role in alleviating pain, including joint pain and neuralgia (Kim et al., 2016).

However, chillies are not always suitable for everyone. Although they offer many benefits, chilli consumption should still be tailored to an individual's physical condition and tolerance. Individuals with digestive disorders such as gastritis or irritable bowel syndrome should consider their personal tolerance, as excessive consumption of chillies can exacerbate symptoms (Bortolotti & Porta, 2015).

Overall, the selection of appropriate and high-quality cultivation methods within a home garden system must take into account agroecological suitability, the quality of certified seeds, sunlight requirements, the plant's natural growth process, as well as its nutritional value and health benefits. This approach is in line with the principles of sustainable agriculture, which emphasise food security, environmental conservation, and the integrated improvement of family well-being (United Nations Environment Programme, 2019).

Seedling

Seedling production is the initial stage in crop cultivation, serving to produce healthy, uniform seedlings with high vigour before they are transplanted to the field. This stage is crucial to the success of horticultural production, as seedling quality is directly correlated with vegetative growth, resistance to environmental stress, and yield potential (Sutopo, 2018). In sustainable agricultural systems, seedling production also plays a role in improving seed utilisation efficiency and reducing the risk of crop failure (Ministry of Agriculture of the Republic of Indonesia, 2021).

Seedling containers can include specialised trays (seedling trays), plastic trays, plastic pots, wooden boxes, plastic bags, or polybags. The use of seedling trays is recommended because each planting hole is separate, thereby minimising root damage during transplanting and improving growth uniformity (Ministry of Agriculture of the Republic of Indonesia, 2021). Furthermore, the container must have a good drainage system to prevent waterlogging, which can trigger root diseases.

The choice of container also affects aeration and root system development. Containers with optimal aeration allow for proper root respiration, thereby supporting the formation of healthy lateral roots (Sutopo, 2018). In modern horticultural practice, the tray system also improves space efficiency and facilitates management at both commercial and domestic scales.

Seedling growing media is essentially the same as potting compost, but must have a finer texture. Screening using wire mesh with a diameter of 2–5 mm aims to remove clumps of soil and gravel so that the medium becomes looser and more uniform. A fine-textured medium is crucial for small seeds as it enhances contact between the seed and soil particles, which influences water absorption during the imbibition process (Sutopo, 2018). Seedling media typically consist of a mixture of soil, mature compost or mature manure, and porous materials such as sand or charcoal. The growing medium must be free from pathogens to prevent damping-off disease, which is often caused by soil fungi such as Pythium and Rhizoctonia (Agrios, 2019). Therefore, sterilisation of the medium or the use of mature organic materials is highly recommended.

Seedling production is generally carried out for small-sized seeds of relatively high economic value, such as aubergine (Solanum melongena), mustard (Brassica juncea), lettuce (Lactuca sativa), chilli (Capsicum annuum), and tomato (Solanum lycopersicum). These seeds are small in size with limited food reserves, thus requiring more controlled environmental conditions to ensure optimal germination (Ministry of Agriculture of the Republic of Indonesia, 2021).

Through seedling production, farmers can select vigorous and disease-free seedlings before transplanting them to the main field. This technique also improves seed utilisation efficiency by reducing losses caused by environmental factors such as heavy rain or early pest attacks (Sutopo, 2018).

From an agronomic and economic perspective, seedling production offers several key benefits, namely: seed efficiency, selection of high-quality seedlings, uniform growth, early disease control, and support for sustainable agricultural systems (Lehmann & Joseph, 2015). Thus, seedling production is not merely the initial stage of cultivation, but an important managerial strategy within an efficient, sustainable horticultural production system, aimed at enhancing food security at both the household and commercial levels. The following illustrates the containers used as seedling media, as shown in Figure 2.

Figure 2. Seedlings, Aubergines, Chillies and Tomatoes

Planting

Planting in vertical farming systems or pots is carried out once the seedlings have 3–5 true leaves, indicating that they are vigorous enough to be transplanted (Indonesian Ministry of Agriculture, 2021). The selected seedlings must be healthy, uniform and free from signs of disease. In vertical rack systems, the planting spacing is generally 10–15 cm to maintain air circulation and space efficiency. In pot systems, a single plant is planted in a 3–10 kg pot, whilst larger pots can accommodate 2–3 plants, particularly for climbing vegetables such as bitter gourd and cucumber. The transplanting process must be carried out carefully to avoid damaging the roots and growing medium, followed by watering until the medium is evenly moist to reduce transplant shock (FAO, 2019). Proper planting techniques have a direct impact on early growth, root system development, and the success of plant adaptation to the new growing medium (Taiz et al., 2018).

Fertilisation

Fertilisation in pot-based and vertical farming systems generally involves the use of liquid organic fertiliser (LOF), which is applied every 3–7 days at a dose of approximately 10–100 ml per litre of water. The application of liquid organic fertiliser aims to gradually increase the availability of macro- and micro-nutrients and to improve soil microbial activity (Ministry of Agriculture of the Republic of Indonesia, 2021). For fruit vegetables with longer growth periods, supplementary fertiliser in the form of manure or compost is required every approximately 30 days at a rate of 50–100 g per plant to maintain the supply of nitrogen, phosphorus and potassium during the generative phase (FAO, 2019). The use of organic fertilisers in urban and backyard horticultural systems has been shown to improve soil quality, water retention capacity, and production sustainability (Lehmann & Joseph, 2015).

Watering

The frequency of watering is influenced by the volume of growing medium, the number of plants, and the growth stage. Generally, watering is carried out 1–2 times a day, particularly in pot systems with a limited volume of growing medium. Water deficiency during the flowering and fruit-enlargement stages can lead to the shedding of flowers and young fruit due to physiological stress (Taiz et al., 2018). Proper water management is essential to maintain a balance between aeration and substrate moisture, as excess water can also cause root rot and reduce nutrient uptake (FAO, 2019).

Pest and disease control

Pest and disease control in vertical farming systems is recommended to be carried out using an environmentally friendly approach through physical control and botanical pesticides. Physical control involves the manual removal of pests, whilst botanical pesticides are used to suppress populations of insect vectors such as aphids that transmit viral diseases (Ministry of Agriculture of the Republic of Indonesia, 2021).

If plants are severely affected by disease, eradication measures (removal of diseased plants) must be taken to prevent transmission. Furthermore, crop rotation at least once a year is recommended to break the pest-disease cycle and maintain soil nutrient balance (FAO, 2019). This approach is in line with the principles of Integrated Pest Management (IPM), which emphasises prevention, monitoring, and the minimal use of chemical inputs to ensure the sustainability of agroecosystems (Pretty & Bharucha, 2015).

Conclusion

The optimisation of backyard land use in Gunungsari Village, West Lombok Regency, has proven to be an effective empowerment strategy in strengthening the community's socio-economic resilience. Through a participatory approach based on extension services, training and mentoring, the

community has seen an increase in capacity in household-scale crop cultivation and fisheries. The utilisation of backyards contributes to increased food availability, additional income, improved environmental quality, and the strengthening of the community's social capital. Therefore, empowerment-based backyard management can be viewed as a strategic instrument in supporting sustainable and competitive village development.

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