
ABDIMAS

Jurnal Pengabdian kepada Masyarakat
<https://journal.unnes.ac.id/journals/abdimas/>

Climate Change Adaptation through Urban Agriculture Food Barn in Tambakrejo, Semarang City

Muh. Sholeh^{1*}, Deby Luriawati Naryatmojo¹, Saptono Putro¹, Andri Sumihar
Simbolon²

¹Universitas Negeri Semarang, Indonesia

²Head External Relation & Media Communications Saka Energi Muriah Limited,
Indonesia

*Corresponding author: muhsholeh@mail.unnes.ac.id

Abstract

As a metropolitan city with limited land for food production, Semarang faces a challenge in maintaining its food security. This issue is exacerbated by climate change, increasing the risk of crop failure. As a result, Semarang still relies on food supplies from other regions. This situation has encouraged innovation through the concept of urban farming. Urban farming allows communities to optimize vacant land, providing a mitigation strategy against food shortages while creating green open spaces and offering economic value. The urban farming activities are supported by SAKA Energi Muriah Limited and Semarang State University, which conduct community empowerment, including: (1) socialization, (2) formation of farmer groups, (3) training for farmer groups, (4) urban farming system training, (5) urban farming implementation, (6) provision of facilities and technology, and (7) monitoring and evaluation. The results show that urban farming successfully provides an alternative food source, especially during floods, and increases community awareness of food security and the environment. Training in cultivation techniques, organizational development, and provision of facilities and infrastructure have been key factors in the program's success. The urban farming model applied includes vertical pipes, hanging pots, and polybags. The plants to be cultivated include Brazilian spinach, celery, strawberries, medicinal plants, and ornamental plants. Active community involvement through institution-building, training, and implementation has strengthened residents' ability to utilize limited urban land while contributing to the provision of green open spaces.

Keywords: *urban, farming, food resilience, sufficiency, tambakrejo*

INTRODUCTION

Food security has become a focal point for Semarang City in 2023 (Pemerintah Daerah Kota Semarang Tahun, 2022). This condition is driven by climate change, which increases the risk of crop failure, affecting the fulfillment of food needs. As a consumer city, Semarang faces challenges in maintaining food availability; thus, the city still relies on supplies from other regions to meet its food needs (Pratomo & Daenie, 2021)

As a metropolitan city with limited land for food production, Semarang faces a challenge in maintaining its food security, causing the city to depend on other regions (Pratomo & Daenie, 2021). Semarang has been experiencing agricultural land conversion into residential or industrial areas. This change is expected to continue, with an estimated 3,980 hectares of rice fields to be lost in the next 66 years if land conversion continues (Hariyanto, 2010). This situation encourages innovation in meeting food needs, one of which is through the concept of urban farming. Through urban farming, communities can optimize vacant land, providing a mitigation strategy against food shortages, creating green open spaces, and offering economic value.

Semarang City has 415 farmer groups and 151 women farmer groups encouraged to promote urban farming in the city (Pemerintah Daerah Kota Semarang Tahun, 2021). One area in Semarang City developing urban farming is Tambakrejo Village, Gayamsari District, Semarang City. This urban farming activity is supported by SAKA Energi Muriah Limited and Semarang State University through community empowerment by developing existing urban farming in Taman Pancasila RW 02 as a pilot

area and an effort to assist the Tambakrejo community in meeting food needs and increasing green open spaces.

Providing food through the concept of urban farming has become an alternative to fulfilling food needs in the face of climate change, the decline in vegetation diversity index, and the decreasing soil quality due to intensive farming patterns (Tomatis et al., 2023)

Taman Pancasila has become one of the alternative food sources in Tambakrejo Village, currently benefiting 28 households in the surrounding area (Utami, 2023). The benefits of Taman Pancasila became even more apparent when Tambakrejo experienced a hydrometeorological disaster of flooding in March 2024, isolating the Tambakrejo area. The urban farming harvest was utilized by the community to meet the needs of public kitchens during the flood.

This initiative will then be replicated through the development of urban farming in RW 07. This replication of urban farming is part of an effort to adapt to climate change by providing alternative food sources using limited land (Rusdayanti, 2023). This replication began with institutional development, skills training, and mentoring.

METHODS

The community service activities in Tambakrejo Village were carried out in groups, comprehensively, and based on local potential. All activities were conducted using groups as the medium for implementation, mentoring, and monitoring. To enhance the community's capacity and skills in urban farming, the program incorporated all aspects, including increasing knowledge and awareness of urban farming, providing cultivation facilities and infrastructure, as well as improving institutional management.

The implementation of community service activities involved four main stages: (1) preparation, (2) implementation, (3) mentoring, and (4) monitoring and evaluation. The specific activities are as follows:

1. Socialization or Education on the Urban Farming Program

This activity aimed to increase the community's knowledge and awareness of urban farming and its benefits. The socialization/education activities were conducted in two sessions, covering urban farming and cultivation techniques. Each session lasted for 90 minutes.

2. Formation and Mentoring of the Tambakrejo RW 07 Farmer Group

To manage urban farming, the establishment of a farmer group institution was necessary to ensure smooth operations. This stage was carried out through a group approach by holding discussions with community groups, motivating and guiding them to form a group, as well as providing institutional training. This activity was conducted in one session lasting 90 minutes.

3. Farmer Group Institutional Training

This activity aimed to provide knowledge and guidance to the leaders and members in institutional management, directing them in performing their functions, strengthening the farmer group, and developing farming businesses. The training was conducted in one session lasting 90 minutes.

4. Training on Urban Farming Cultivation Techniques

The cultivation technique training aimed to increase the community's knowledge and skills in urban farming, with the knowledge gained to be applied in daily life. The activities were conducted in two sessions, with each session lasting 90 minutes.

5. Implementation of Urban Farming Cultivation Techniques

The implementation of cultivation techniques was aimed at developing techniques, models, and urban farming technologies that are adaptive to flooding. This activity was conducted in two sessions, each lasting 90 minutes.

6. Provision of Facilities, Infrastructure, and Cultivation Technology

This activity involved providing support or assistance in the form of facilities, infrastructure, and technology required for plant cultivation as capital and to facilitate farming activities. The facilities provided included polybags, vegetable seedlings, compost-making sets, and other farming tools.

7. Program Monitoring and Evaluation

After each stage of the activity, monitoring and evaluation were conducted to assess the program's performance and sustainability, identify any problems or challenges that arose, and evaluate the continuation of the program.

RESULTS AND DISCUSSION

Socialization and Coordination of Activity Plans

The socialization of urban farming activities was conducted on Thursday, May 9, 2024, from 18:30 to 20:00 at RT 4 RW 7 Tambakrejo (Mrs. Marsono's House). The purpose of the socialization program is to coordinate the implementation plan for urban farming and to conduct an initial survey of the placement of plants and suitable planting techniques. On this occasion, the management plan for urban farming by the PKK of RT 04 RW 07 was also agreed upon.

The initial socialization activity involved Mr. Wakijan (Head of RW 7), the UNNES service team, and the PKK of RT 4 RW 7. During this opportunity, the service team facilitated discussions regarding the urban farming activity plan, including the implementation location, the plants to be planted, the planting system, and threats such as rats and flooding.

The types of plants that the PKK showed interest in include chili, kaffir lime, tomatoes, eggplant, pakcoy, basil, ginger, turmeric, kencur, spinach, and grapes. Several planting systems agreed upon include hanging pots, PVC pipes (vertical farming), planter bags, raised beds, and mess areas. The wall locations chosen for the PVC pipe plants include Mrs. Tresna, Mrs. Dwi, and Mrs. Roni. The PKK expressed interest in several types of vegetables that can be utilized in daily life.



Fig. 1. Coordination and socialization of the urban farming plan in RT 04 RW 07

Survey of Urban Farming Locations

The location survey was conducted on Sunday, May 12, 2024. This activity was attended by the UNNES diffusion service team, Mr. Wakijan as the head of RW 7, the head of RT 4, and several local residents. The purpose of this activity was to identify areas that have the potential for urban farming implementation in the vicinity of RT 4 RW 7. This activity is an initial step initiated by the local community. The survey was also assisted by Mr. Bobby, the head of the Tambakrejo Farmers Group.

Activities carried out included: (a) Measurements for the PVC pipe (vertical) concept (b) Agreement on the land to be used (c) Agreement on the types of plants to be implemented (d) Methods of urban farming concepts to be used. The urban farming plan to be implemented in RT 4 RW 7 will use the vertical PVC pipe concept, hanging pots, and polybags. The survey conducted has educated the attending community members about the benefits of urban farming. Additionally, the suggestions provided by the community demonstrate enthusiasm and spirit from the residents of RT 4 RW 7, which can enhance community awareness and participation in environmental preservation. Further discussions will be held in meetings with the RT 4 RW 7 men during the regular RT gathering on Sundays.



Fig. 2. Survey and measurement of vertical garden location plan

Training on Urban Farming Cultivation Techniques

The training on urban farming cultivation techniques was conducted on Sunday, May 26, 2024. This activity was held to provide skills related to preparing planting media, plant care, and pest and weed control to the PKK as urban farming practitioners of RT 4 RW 7. The training was led by Mr. Bobby and Mr. Nur from the Tambakrejo Farmers Group, who have experience in plant care from planting to post-harvest.

The activities carried out included: (a) Opening remarks by the service team from UNNES and a welcome speech from representatives of the local RT and RW; (b) Oral explanation by Mr. Bobby regarding the stages of preparing planting media; (c) Demonstration of planting media preparation by Mr. Bobby, followed by seed planting by urban farming members; (d) Explanation of plant care using fertilizers and pesticides by Mr. Nur and Mr. Bobby; (e) Distribution of several hanging pots to Mrs. Timur.



Fig. 3. Preparation of planting media using polybags

The composition of the planting media consists of a 1:1 ratio of planting media and fermented cow manure, followed by the addition of dolomite lime. Once the planting media mixture is ready, it is placed into 30x30 cm polybags, filling them halfway.

The next step in urban farming is sowing plant seeds in the prepared planting media. The plants to be cultivated include Brazilian spinach, celery, strawberries, medicinal plants, and ornamental plants. The seedlings are placed in the polybags and filled up to 3 cm from the top. After that, the plants are watered and supported with stakes to prevent them from falling, secured with raffia.

The planted seedlings are placed in a shaded area for one day. The following day, they are moved to a location that receives direct sunlight. Plant care involves watering the plants in the morning and evening. For fertilization, a mixture of monosodium glutamate (MSG) and water in a ratio of 1 liter is used. Pest control at home can be done with garlic twice a week, and tobacco or kitchen waste compost can also be used. For pest management, household pesticides should be applied twice a day, with the technique of watering the plants first before spraying the pesticide for pests.



Fig. 4. Seeding of planting seeds

Installation of Iron and Wire Mesh for Vertical Garden

The installation of iron and wire mesh for the vertical garden in urban farming was conducted at RT 4/RW 7, utilizing the limited land available in the surrounding area. The use of this limited space is expected to enhance food security and improve the aesthetics of the environment. This activity involved local community members and included discussions about the installation model and agreed-upon sizes, followed by measurement, cutting, and proper installation, as well as the preparation of vertical garden pots and hanging pot supports using leftover iron. The activity began with discussions to align community members' perceptions regarding the installation model and its dimensions.



Fig. 5. Creation of wire mesh for the vertical garden

Measurements and cutting of the iron and wire mesh were then conducted, followed by the successful installation of the wire mesh and iron. In the next stage, pots measuring 20 cm were prepared for the vertical garden, along with planting media and pakcoy seedlings, while the leftover iron was used as supports for the hanging pots. There was good cooperation in the preparation of this installation, allowing local residents to assist in the process and providing all necessary materials and tools, which had been prepared by the UNNES Diffusion Team.

Implementation of Urban Farming Cultivation Techniques

On June 23, 2024, the culmination of all the training conducted took place, involving the planting of vegetables at RT 04 RW 07. This activity was carried out collaboratively with the local men and PKK of RT 04 RW 07. A total of 60 pots were planted in the vertical garden, along with 20 hanging pots.



Fig. 6. Planting vertical garden plants

CONCLUSION

The urban farming program in Tambakrejo Village, Semarang City, has proven effective as a form of adaptation to climate change. The implementation of urban farming not only plays a role in mitigating the impact of hydrometeorological disasters such as floods but also encourages awareness of the importance of sustainable and environmentally friendly agricultural practices. The use of selected planting media, namely polybags and vertical gardens, can increase food security and improve the aesthetics of the surrounding environment. Active community involvement through training and institutional formation has strengthened the ability of residents to utilize narrow land in urban areas, while contributing to the provision of green open spaces. Replication of the program in other RWs shows the potential for the sustainability of this program in the long term as an innovative solution to the challenges of climate change.

ACKNOWLEDGMENT

We would like to extend our sincere gratitude to Saka Energi Muriah Limited for their generous support through the PPM Program, which has been instrumental in the success of the Urban Agriculture Development Program in the City of Semarang. Their dedication and commitment to promoting sustainable agricultural practices in urban areas have been invaluable, and this initiative would not have achieved such positive outcomes without their collaboration.

REFERENCES

- Hariyanto. (2010). Pola dan intensitas konversi lahan pertanian di Kota Semarang tahun 2000-2009. *Jurnal Geografi*, 7(1), 1-10
- Pemerintah Indonesia. (2020). *Peraturan Presiden Republik Indonesia Nomor 18 Tahun 2020 tentang rencana pembangunan jangka menengah nasional 2020-2024*.
- Pemerintah Daerah Kota Semarang. (2021). *Peraturan Walikota Semarang Nomor 24 Tahun 2021 tentang gerakan pembudayaan pertanian perkotaan di Kota Semarang*.
- Pemerintah Daerah Kota Semarang. (2022). *Peraturan Walikota Semarang Nomor 44 Tahun 2022 tentang rencana kerja pemerintah daerah Kota Semarang tahun 2023*.
- Pratomo, Y. S., & Daenie, M. (2021). Mewujudkan kebijakan pembangunan ketahanan pangan di Kota Semarang. *Public Service and Governance Journal*, 2(2), 95-105
- Rusdayanti, N. (2023). Urban Farming sebagai Alternatif Ketahanan Iklim Perkotaan Sektor Pertanian. In *Low Carbon Development Indonesia* (p. 1). <https://lcdi-indonesia.id/2023/11/08/urban-farming-sebagai-alternatif-ketahanan-iklim-perkotaan-sektor-pertanian/>
- Tomatis, F., Egerer, M., Correa-Guimaraes, A., & Navas-Gracia, L. M. (2023). Urban Gardening in a Changing Climate: A Review of Effects, Responses and Adaptation Capacities for Cities. *Agriculture*, 13(2), 502. <https://doi.org/10.3390/agriculture13020502>
- Utami, K. D. (2023). Memanen Untung Berganda dari Pertanian Urban di Semarang. In *Harian Kompas* (p. 1). <https://www.kompas.id/baca/nusantara/2023/08/31/memanen-untung-berganda-dari-pertanian-urban>