



# Hydroponic Melon Cultivation Based on The Dutch Bucket System as A Solution to Improve The Family Economy After Natural Disasters in Sigi District

Mohamad Al Riski<sup>1</sup>, Alimudin Laapo\*<sup>2</sup>, Ramal Yusuf<sup>3</sup>

<sup>1</sup> Mahasiswa Program Studi Agribisnis, Fakultas Pertanian, Universitas Tadulako, Palu, Indonesia

<sup>2</sup> Dosen Program Studi Agribisnis Fakultas Pertanian Universitas Tadulako, Palu, Indonesia

<sup>3</sup> Dosen Program Studi Agroteknologi Fakultas Pertanian Universitas Tadulako, Palu, Indonesia

Received: October 18, 2024

Revised: November 27, 2024

Accepted: December 15, 2024

Published: December 31, 2024

Corresponding Author:

Alimudin Laapo

[alimudinlaapo@untad.ac.id](mailto:alimudinlaapo@untad.ac.id)

DOI: [10.29303/ujcs.v5i4.754](https://doi.org/10.29303/ujcs.v5i4.754)

© 2024 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** The earthquake and liquefaction disaster in 2018 and the Covid-19 outbreak had an impact on the economic decline of the people in Sigi Regency, resulting in a low Family Economic Resilience Index. This study aims to design a model for empowering women's groups in Sigi Regency, in order to improve the family economy by providing education regarding melon cultivation (*Cucumis melo* L.) which is supported by the application of the Dutch bucket hydroponic system as a business opportunity. The target and location of the study is the Family Welfare Empowerment Group (PKK) in Soulowe Village, most of whom work as housewives. The analytical method used in designing the economic empowerment of PKK families is Participatory Rural Appraisal (PRA) analysis. The stages of participatory implementation include assessing the needs of community groups through filling out questionnaires, outreach, training, assistance with maintenance, harvest and post-harvest, and marketing. The results of the program implemented are the availability of a hydroponic installation used for the melon cultivation process, a partner guidebook that can assist partners in carrying out the cultivation process independently, quality organic melon harvests, a marketing partnership for cultivated products with fruit shops and support from village government to develop existing programs. So, this program can continue to be sustainable and become the right solution to help improve the economy of families in Soulowe Village.

**Keywords:** Dutch Bucket Hydroponics; Economic Empowerment; Gender.

## Introduction

The Family Welfare Development (PKK) Group of Soulowe Village, Dolo District, Sigi Regency has been formed since 29 December 2022, since its formation this group has not fully implemented the program due to the absence of capital provided by the government, besides the lack of education and innovation related to the program to be implemented, so that this group only conducts general activities such as conducting weekly recitation and joint sports. This is certainly not able to realise the objectives of the PKK group as a group that can provide guidance to its members for the welfare of

the family (Indarwati, 2017). Meanwhile, referring to data from the Ministry of Villages in 2021, the Economic Resilience Index (IKE) of Soulowe Village only reached 0.4557, making Soulowe Village a village with disadvantaged status.

Soulowe Village is one of the villages affected by the 2018 earthquake and soil liquefaction in Central Sulawesi (BNPB, 2018). The problems caused by the disaster were the damage to residents' agricultural land and the disconnection of irrigation channels which made it difficult for the community to carry out the agricultural cultivation process, which had an impact on the community's economy because most of the Soulowe

### How to Cite:

Al Riski, M., Laapo, A., & Yusuf, R. (2024). Hydroponic Melon Cultivation Based on The Dutch Bucket System as A Solution to Improve The Family Economy After Natural Disasters in Sigi District. *Unram Journal of Community Service*, 5(4), 485-491. <https://doi.org/10.29303/ujcs.v5i4.754>

Village community depended on agricultural products. The impact of this natural disaster is very detrimental to the community, especially coupled with the Covid-19 pandemic which also hampers the activities of the Soulowe Village community.

One element of society that feels the same way is housewives and some are widows so they have to meet their own needs and families because there is no longer a husband who earns a living, they are members of the Soulowe Village PKK Group, previously the government had provided all assistance in the form of money and basic necessities that could support the community's economy. However, this has not had an impact on the community because it does not last long if the community is not properly empowered (Herdiana et al., 2021) The self-capacity building programme for the Soulowe Village PKK group Soulowe is carried out while fulfilling the main task as a housewife.

This programme is very suitable because empowerment is an activity carried out in the community environment with efforts to build the potential that exists in the environment itself (Solikhah et al., 2018). The most appropriate thing to do is to provide education related to commodities that are rich in vitamins, namely melon fruit (*Cucumis melo L.*) with the application of the dutch bucket hydroponic system as a business opportunity in improving the family economy of the Soulowe Village PKK group (Lestari et al., 2019).

The dutch bucket hydroponic system can be used for plants with taproots, one of which is melon (*Cucumis melo L.*) which can absorb nutrients directly (Alfiah & Cordova, 2015). The advantages of the dutch bucket system are faster plant growth, maintained plant quality, free from pesticides and heavy metals contained in the soil so that the products produced are more hygienic (Choirina et al., 2021).

The selection of melon (*Cucumis melo L.*) as a commodity that is cultivated because it has a high vitamin content (Daryono et al., 2011). And no one has ever cultivated hydroponic-based melon (*Cucumis melo L.*) in Sigi Regency and its surroundings because the land to be planted was damaged by the disaster (Toiba et al., 2023). So, through this empowerment programme is expected to be a solution to the problems that occur because, the purpose of this programme is to empower the Soulowe Village PKK group, in order to improve the family economy by providing education related to melon fruit (*Cucumis melo L.*) which is supported by the application of the dutch bucket hydroponic system as a business opportunity this element is in accordance with the statement (Agustina et al., 2014). Empowerment through the application of the dutch bucket system is expected to be useful in improving the economy and knowledge of the Soulowe Village PKK women's group.

## Method

This programme is a community service activity carried out in Soulowe Village by involving the Soulowe Village PKK group in all series of activities carried out. This activity took place since mid-June 2023 which began with a discussion process with the Soulowe Village PKK group as partners. The flow of activity implementation consists of:

### *Giving questionnaires*

The questionnaire was given 3 times. The first or initial questionnaire was given before the socialization of the program was carried out, this first questionnaire aims to see the understanding of the Soulowe Village PKK group with hydroponic-based melon cultivation, the results of the questionnaire are used as a reference in providing material during program socialization, after that the second or follow-up questionnaire is given after the program runs, to find out the increase in understanding of the Soulowe Village PKK group of the programs that have been carried out and the last questionnaire is given when the marketing process is complete, this questionnaire aims to measure how useful the program implemented and the potential for program sustainability.



**Figure 1.** Administration of questionnaires

### *Socialisation of the programme*

The socialisation was conducted at the beginning of the programme, and was attended by all 15 members of the Soulowe Village PKK group. This socialisation aimed to introduce the dutch bucket hydroponic system and the melon commodity (*Cucumis melo L.*), as well as the potential of this commodity.



**Figure 2.** Programme socialisation

### *Training*

Training activities were held at the house of the head of the Soulowe Village PKK group. This training was attended by all members of the Soulowe Village PKK group. The resource person for this training was the PKM-PM team. This training contains how to cultivate melon plants hydroponically, the maintenance process during cultivation to the melon harvesting process. This training began with an introduction to the dutch bucket hydroponic system, introducing the seedling media to be used, the procedure for sowing melon seeds to how the process of transferring melons into the main media. In addition, the Soulowe Village PKK group was also educated on how to control the amount of nutrient content. In an effort to clarify and facilitate the training process, the tools and materials that will be used during the programme have been prepared so that the training process is not only centred on theory but directly on practice.

The tools and materials that had been prepared were shown to all members of the Soulowe Village PKK group who were present so that they could find out about them. When providing material about seeding, it was shown how to cut rockwool media, this was also practised directly by PKK women. After cutting the rockwool, they were taught how to place the seeds and the process of applying water. Not only that, the PKK group was also taught how to use a pH meter which functions to determine the pH of the water and a TDS meter which will be used during the cultivation process to measure nutrient content. The training continued outdoors by practising how to dissolve AB mix nutrients that will be used for plant nutrition during the cultivation process.

### *Hydroponic Maintenance Assistance*

Maintenance activities are carried out from the beginning of seeding until the seedlings are transferred from the nursery to the main media for plant growth, followed by the adjustment process, and checking

nutrition as well as installing ropes as a place for melon vines and trimming the axils of the leaves. We did the seeding together with the PKK group on 25 July 2023 at the house of the head of the Soulowe Village PKK group. During the seeding process, group members checked every day and ensured that the seeds were exposed to sufficient sunlight and ensured the humidity of the rockwool. When the seeds were 8 days old after sowing, the process of transferring melon seedlings to the main growth medium, namely hydroton media supported by netpots and buckets as a reservoir of nutrient water. After all the planting is complete, the process of adjusting and checking the nutrients to ensure that the nutrient content and pH of the water are in accordance with the needs of melon plants. In addition, mating between male and female flowers on melon plants is carried out to support the process of fruit formation called pollination.

Nutritional checks are carried out every day by the team and the PKK group, this is done alternately until harvest time arrives. When the plants are 27 HST (Days After Planting), supporting ropes are installed next to the bucket, this is done so that the plants can creep up, the last maintenance activity carried out is pruning branch leaves or leaves that are in the armpit and pruning the tops of plants when the plants have started to bear fruit, this is done to optimise plant growth and yield.

### *Harvest and post-harvest treatments*

Harvest and post-harvest activities go hand in hand. Harvesting was done after the plants were 60 HST. The harvesting process was carried out with the Soulowe Village PKK group. Each plant only produces 1 melon so that the weight of the melon fruit size is perfect.

After the harvest process is complete, the post-harvest stage is then carried out such as wrapping the harvested melons to maintain the quality of the fruit before marketing, after which cleaning the remaining plants in the planting medium as well as the hydroponic circulation system and the environment around hydroponics so that when the next planting season plant growth can remain optimal. In addition, the hydroponic installation was moved to the yard of the house of the head of the Soulowe Village PKK group.

### *Marketing*

Marketing activities began with promoting the products to the PKM-PM team's social media and selling the products directly to consumers who could be reached. However, this was less effective so a search for a permanent partner for marketing melon hydroponic products was carried out. The process of finding partners was carried out after the harvest process was completed, namely on 2 August 2023, then a permanent

partner was found, namely Hup Buah on 4 August. This fruit leader is willing to buy all the harvest products so that the remaining melon commodities are sold entirely to Hup Buah.

#### *Methods of Analysis*

Participatory Rural Appraisal (PRA). PRA is an action research method designed to increase community involvement in development. Robert Chambers claims that PRA will enable villagers to express and analyse their situation and optimally plan and implement these provisions in their village (Mikkelsen, 2011). In PRA, villagers play an active role in mapping social problems and their causes, roadmap and programme implementation towards problem solving, community cooperation, ownership, and self-reliance-based budget support and implementation. PRA is also a good tool for identifying community needs at the local level: 1). The researcher's position in PRA is that of a facilitator, one who facilitates the community to conduct action research.

### **Result and Discussion**

The application of dutch bucket system hydroponic-based melon cultivation has achieved maximum results, based on the activities that have been carried out. Socialisation activities can be an education that increases the knowledge of the Soulowe Village PKK group regarding hydroponic-based melon cultivation with a dutch bucket system, socialisation activities are carried out in one day with a duration of approximately 3 hours. During the implementation of socialisation activities, the Soulowe Village PKK group was very active and had high curiosity, moreover before participating in this activity the Soulowe Village PKK group had been given a questionnaire containing questions about hydroponic-based melon cultivation with a dutch bucket system, but the average answer obtained was that no one knew about hydroponic-based melon cultivation with a dutch bucket system. Thus, the socialisation material provided was adjusted to the questions about the questionnaire that had been given.

Training activities were carried out by providing simple examples or guidelines that were practised directly by the Soulowe Village PKK group regarding how to cut rockwool neatly and how to plant Grock variety melon seeds so as to increase the knowledge and skills of the Soulowe Village PKK group, training activities were carried out in one day with a duration of 2 hours. All members of the Soulowe Village PKK group seemed very enthusiastic and able to do it independently, moreover during the training activities some of the methods used were relatively easy so that the Soulowe Village PKK group did not feel difficult.



**Figure 3.** Training

Melon hydroponic plant maintenance activities begin at the beginning of melon seed sowing by paying attention to the condition of the rockwool in a humid and sunny condition in the morning for approximately 3 hours, at the age of 8 days after sowing the seeds grow perfectly into seedlings, so they are ready to be transferred to the hydroton planting medium which is contained by a netpot placed in the middle of the bucket cover as a support. Then proceed with the process of adjusting and checking the ppm of nutrients periodically to ensure the amount of ppm is in accordance with the growth period of melon plants, checking nutrients every day until the harvest period arrives. In addition, the growth of hydroponic-based melon plants requires the help of a rope as a support for the propagation of the stem wrapped around upwards, installing the rope as a support is done when the plant is 27 HST. The available nutrients must be channeled perfectly to melon plants, so that the supply of nutrients to plants is channeled perfectly, some parts of the leaf axils are trimmed to minimise the flow of nutrients to the leaf axils which will reduce nutrients that focus on the formation of flowers and fruit. After flowers appear on melon plants, pollination or marriage is carried out between male and female flowers on each plant to support the process towards fertilisation.



**Figure 4.** Maintenance Assistance

Harvesting activities are carried out after the plant is 60 HST, harvesting activities are carried out with the Soulowe Village PKK group by obtaining one fruit on one plant so that the fruit produced is of maximum size and quality. There are 40 buckets of melon plants with two varieties of melons, 30 buckets planted with Grock melon varieties and 10 buckets of Golden Melindo varieties. The fruit harvest was 30 fruits with an average weight of 2 kg for the Grock melon variety and 5 fruits for the Golden Melindo variety with an average weight of 1.5 kg. After harvesting activities are completed, post-harvest activities are continued by selecting fruits that will be marketed with good quality weight and shape, then some melon fruits are cut and packaged using plastic wrapping, in addition to cleaning the hydroponic installation to prepare for the next planting. The Soulowe Village PKK group was very happy and excited to be able to harvest melons from hydroponic cultivation.



Figure 5. Harvest and post-harvest process

Marketing activities are carried out by promoting melons to social media and selling products directly to consumers who are easily accessible. In addition, marketing activities are also carried out by finding a permanent partner to sell melon harvests, a permanent partner for the sale of hydroponically cultivated melon fruit is Hup Buah, selling melon fruit to Hup Buah partners as much as 5 melons of the Grock variety at a price of IDR 15,000 per fruit and 2 melons of the Melindo variety at a price of IDR 22,000 per fruit, based on discussions conducted Hup Buah will continue to accept hydroponically cultivated melon harvests because they are considered organic and free of pesticides. Not only selling the fruit as a whole, the team and the PKK group sold the fruit by the piece at a price of IDR 10,000, this was done to increase sales.



Figure 6. Marketing

There are several series of activities that have been carried out to make the PKM-PM programme more efficient, namely: (1) Assistance in hydroponic-based melon cultivation in order to implement a sustainable agricultural cultivation system and as a business opportunity to improve the family economy; (2) Collaboration with Hup Buah, a fresh cut fruit outlet, to sell the melons directly; (3). Draft articles outside the output of the proposal, namely: (a) News released on the website [www.kabarselebes.id](http://www.kabarselebes.id) entitled Innovation of Untad Palu Students in Hydroponic Melon Cultivation with Dutch Bucket System, Encouraging Agricultural Progress in Soulowe Village, dated 14 October 2023, at URL:

<https://www.kabarselebes.id/berita/2023/10/07/inovasi-mahasiswa-untad-palu-dalam-budidaya-melon-hidroponik-sistem-dutch-bucket-dorong-kemajuan-pertanian-di-desa-soulowe/>; (b) News released on the website [palu.ragam-indonesia.com](http://palu.ragam-indonesia.com) entitled Improving Community Skills, PKM-PM Team Realises Hydroponic Program, dated 14 October 2023, at the URL: <https://palu.ragam-indonesia.com/nasional/67010425528/tingkatkan-keterampilan-masyarakat-tim-pkm-pm-realisisasikan-program-hidroponik-melon>.

#### *Potential Sustainability of the Programme*

The dutch bucket system hydroponic-based melon cultivation programme is a programme to improve the community's economy, knowledge and skills. This programme is based on the condition of the Soulowe Village PKK group which is difficult to improve family economic conditions due to the disaster and the Covid-19 pandemic. The existence of this programme is expected to be able to provide solutions to existing problems. Therefore, during the programme there were many potential achievements obtained during the programme:

#### *Social Aspect*

This community service programme certainly provides motivation for the Soulowe Village PKK group which was previously less active due to a lack of programmes to run. The activeness of the Soulowe Village PKK group has greatly increased after this

programme, which is certainly a good example in the community. The increase in activeness of the Soulowe Village PKK group is because all members are directly involved during the hydroponic-based melon cultivation programme. It is hoped that all members of the PKK group will become people who play a role in channeling the knowledge gained during the programme to the Soulowe Village community so that the development of the programme can occur independently among the community.

#### *Economic Aspects*

This programme is certainly expected to be able to become a new source of knowledge for PKK groups so that in the future they can be more creative and innovative in utilising existing land as a source of business so that hopefully economic stability can be achieved. Furthermore, with this programme, it is hoped that new businesses with clear prospects will be created so that the PKK group community can meet the needs of family fruit consumption and it is possible that this can meet market demand.

#### *Business Development Potential*

The dutch bucket system hydroponic melon cultivation programme is new to the Soulowe Village community, so this is an opportunity that can be developed on a large scale. Seeing how the village government supports the programme and the enthusiasm of the surrounding community during the programme. The potential for business development can also be seen from the considerable market demand for melons and the production of melons cultivated during the programme succeeded in entering the Palu City area market. Currently, the Soulowe Village PKK group also has a permanent marketing partner.

### **Conclusion**

The Hydroponic-Based Melon Cultivation Programme of the dutch bucket system has been running well, through the provision of education and application of hydroponic cultivation as well as several series of activity implementation processes, of course, it has a positive impact on the Soulowe Village PKK group because it increases the knowledge and skills of the partner community. The presence of this programme makes the Soulowe Village PKK group an element of society that can share knowledge with other communities, so this programme is very feasible to continue, which is seen from several supporting aspects, especially the economic aspects that can be used as a business opportunity for the Soulowe Village PKK group in a sustainable manner, moreover the village officials have supported this programme.

### **Acknowledgments**

We would like to thank the Ministry of Education through the student creativity programme (PKM) activity fund, PIMNAS, and the Student Affairs department of Tadulako University and the Faculty of Agriculture of Tadulako University.

### **References**

- Agustina, R., Saleh Soeaidy, M., & Ribawanto, H. (2014). Peran Stakeholder Dalam Meningkatkan Perekonomian Lokal Melalui Industri Kecil Menengah (IKM) (Studi pada Dinas Perindustrian, Perdagangan, Pertambangan dan Energi Kota Kediri). *Jurnal Administrasi Publik*, 2(5), 844-850. <https://media.neliti.com/media/publications/79603-ID-peran-stakeholder-dalam-meningkatkan-per.pdf>
- Alfiah, W. F., & Cordova, H. (2015). Implementasi Kontrol Logika Fuzzy (KLF) Dalam Pengendalian Kadar Keasaman (pH) Hydroponic Dutch Bucket System Pada Tomat Cherry. *Jurnal Teknik ITS*, 4(1), 1-6.
- BNPB. (2018). *Informasi Kebencanaan Bulanan Teraktual*. . Badan Nasional Penanggulangan Bencana, Jakarta.
- Choirina, V. N., Setiyadi, H., Ohoitumur, S. F., & Ambiya, M. W. (2021). Analisis Tingkat Produksi Dan Kelayakan Usahatani Buah Melon, Tomat Cherry, Dan Stroberi Dengan Sistem Hidroponik Studi Kasus Di P4S Hikmah Farm Kecamatan Pare, Kabupaten Kediri. *Innofarm:Jurnal Inovasi Pertanian*, 23(2), 133-139. <https://doi.org/10.33061/innofarm.v23i2.6020>
- Daryono, B., Maryanto, S., & Huda, I. (2011). *Kebangkitan Pertanian Indonesia*. Kebun Pendidikan Penelitian Pengembangan Pertanian (KP4) Universitas Gadjah Mada.
- Herdiana, D., Wahidah, I., Nuraeni, N., & Salam, A. N. (2021). *Implementasi Kebijakan Bantuan Langsung Tunai (BLT) Dana Desa Bagi Masyarakat*.
- Indarwati, R. (2017). *Strategi Pelaksanaan Tim Pemberdayaan Kesejahteraan Keluarga (Pkk) Dalam Meningkatkan Pemberdayaan*. 5(2), 861-872. <https://doi.org/http://ejournal.ip.fisip-unmul.ac.id/site/?p=2494>
- Lestari, Y., Khusumadewi, A., Fathurrohman, A., Fitroni, H., & Ubaidillah. (2019). Pemanfaatan Lahan Sempit Dengan Hidroponik Dutch Bucket System Untuk Mewujudkan Ecogreen-Pesantren Melalui Program Santripreneur Di Pondok Pesantren K.H.A. Wahid Hasyim Bangil Pasuruan. *Soeropati*, 2(1), 71-86. <https://doi.org/10.35891/js.v2i1.1778>
- Mikkelsen, B. (2011). *Metode Penelitian Partisipatoris dan Upaya Pemberdayaan*. Yayasan Obor Indonesia.
- Solikhah, B., Suryarini, T., & Wahyudin, A. (2018).

Pemberdayaan Ibu Rumah Tangga Melalui Pelatihan "Hidroponik." *Jurnal Abdimas*, 22(2), 121-127.

<https://doi.org/https://doi.org/10.15294/abdimas.v22i2.16278>

Toiba, H., Putritamara, J. A., Bushron, R., & Aziz, A. L. (2023). Aplikasi dan Pendampingan Usaha Greenhouse Melon dan Paprika Hidroponik sebagai Upaya Pemberdayaan Korban Bencana Gunung Semeru. *Jurnal Dinamika Pengabdian*, 8(2), 367-376. <https://doi.org/10.20956/jdp.v8i2.24088>