Utilization of the yard to support family food security in the pandemic time of Covid-19

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Abstract. This paper aims to provide and alternatives to the use of relatively narrow yards for cultivating hydroponic vegetables that are environmentally friendly and free from chemical pesticide residues. The activity was carried out in RT 9 Handil Jaya Village, Jelutung District, Jambi City during the Covid-19 pandemic from March to August 2020. Data collected has material requirements, production, distribution, and the impact of activities. The data were analysed quantitatively. The hydroponic technology of the Nutrient Film Technique system is placed attached to the yard fence using 12 rods of 3-inch pipe with a length of 3 m and a distance of 15 cm so that there are 240 planting holes using one reservoir. Several types of vegetables are planted, such as celery, lettuce, spinach, kale, pakcoy and kailan, which are planted as needed and harvested. The production of this vegetable has exceeded the needs of the family and even sold to markets, kebab and burger traders for 25,000 IDR. Farming profit is 538,703 IDR for every 40 days of harvest or 4,309,624 IDR in 8 harvests a year. Based on the calculation of B/C Ratio and R/C Ratio, this farming deserves to be continued and provides benefits

1. Introduction
Efforts to improve household welfare through the use of homestead land have been carried out by introducing innovative adaptive technologies. The various technological components introduced to utilize the yard land are packaged in the Sustainable Food House (RPL). The development of RPL is an effort to accelerate self-reliance and household food security through increasing food diversification [1]

In rural communities, the use of yard land for planting crops for family needs has been going on for a long time and is still developing today, although there have been various shifts. The government’s commitment to involve households in realizing food self-sufficiency needs to be actualized in re-activating the culture of planting in home gardens, both in cities and in rural areas [2]

Yard is open land located around a residential house. If this land is properly maintained, it will provide an attractive environment, comfortable and healthy and pleasant, so that the residents feel at home staying at home. The house yard can be used according to taste and desire. For example, by planting productive plants such as ornamental plants, fruit, vegetables, spices and medicines. Planting productive plants in the yard will provide multiple benefits, one of which is physical and spiritual satisfaction. The beautiful garden around the house will be able to inspire and inspire those who look at it [3]
Vegetable garden is an example of a multi-functional garden. On the one hand, the appearance is quite impressive and when harvested can be used as food. Even if a sufficient quantity can be sold which will provide an economic advantage [4,5]. The vegetable garden in our yard also supports a green lifestyle, which is an effort to overcome the rate of global warming that can be started from your own home. As is known, plants during the day photosynthesize by taking CO2 from the air and as a result plants release O2 into the air. So, by growing vegetables in the yard of the house can reduce the concentration of CO2 which is increasing due to the emission of motorized vehicles passing by around the house [6].

The Covid-19 pandemic that has hit Indonesia since March 2020 has disrupted several sectors of public life, including the agricultural sector. Because the agricultural sector has a close relationship with national food security. Food security is something that must be endeavoured to avoid a food crisis that seems to haunt Indonesia. Efforts to provide food needs and increase household welfare through the use of homestead land need to be carried out by introducing innovative and adaptive technology. The use of yards is not only to meet food needs at the household level, but can also reduce expenses and even increase family income if managed optimally [7,8].

Limited land becomes one of the limiting factors which results in difficulty in cultivating food. Urban communities do not have a place to plant, so they are greatly affected by conditions of scarcity and the price of foodstuffs. The use of the yard or house yard is an alternative that can be chosen to still be able to meet food needs independently. Hydroponics is one possible option maximize the potential of the yard and meet household needs [9,10].

Hydroponics is a method of farming without using soil media. Hydroponics is very suitable to be applied in densely populated urban areas because it takes up minimal space and does not require land. The manufacturing method and the materials needed are quite simple. Some hydroponic systems even use used items such as plastic bottles, used cloth, and various other unused materials. Utilization of yards not only meets food needs at the household level, but can also reduce expenses and even increase family income if managed optimally [11,12].

The definition of hydroponics literally means hydro = water, and phonic = work, so that generally means an agricultural cultivation system without using soil but using water containing nutrient solutions [9]. The history of hydroponics began in the early 1930s in Berkley California, where William Frederick Gericke pioneered the hydroponic system, which is a cultivation system using water containing nutrients and minerals without soil. In principle, plants can live in the soil because of the availability of nutrients and if these nutrients can be provided in water with treatment, plants can also live and give the same results. Nutritional factors are one of the most important determinants of crop yield and quality. The most basic nutrient solutions are Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg) and Sulphur (S) are also equipped with micronutrients. Plants absorb ions from the nutrient solution that is given continuously in low concentration levels or dependence on natural conditions. Besides having advantages, hydroponic cultivation of vegetables has disadvantages, including: (1) expensive initial investment, (2) requires special skills, (3) availability and maintenance of hydroponic equipment is rather difficult [9,13,14].

Writing this material aims to provide alternatives and motivation to the community about how to use relatively narrow yards for the cultivation of hydroponic vegetables that are environmentally friendly, fresh, green and free of chemical pesticide residues, both during the Covid-19 pandemic and in the new normal and post-Covid-19, so that people are willing and able to use their yards to meet the family's daily vegetable needs.

2. Materials and methods
The activity was carried out in RT 9 Handil Jaya Village, Jelutung District, Jambi City during the Covid-19 pandemic from March to August 2020. As a result of Stay at Home and Work from Home (WFH). Activities during WFH are certainly not far from sleeping (mattresses), eating (kitchen) and bathing (wells) and being in the yard. The narrow housing complex does not have large yards, but with
hydroponic technology it can still be used to produce vegetables for the daily needs of the family. The hydroponic module of the NFT system has been around since 2017, attached to the yard fence.

Hydroponic NFT system is a modern hydroponic system that is most widely used on a home industry scale. This system consists of an array of interconnected terraced containers and automatic water circulation. This system relies on a water pump machine to deliver water to a higher level and keep oxygen available. The tools and materials needed are: Parallon pipes, pipe joints, water pumps, glue or pipe adhesive, water storage containers, cutting tools (saws, scissors, cutters etc.), rockwool, net pots, flannel cloth and vegetable plant seeds.

The next activity begins with cutting the Parallon pipe into sections with the same length and size, namely 3 meters, there are 12 Parallon pipes with details of 6 rods on the right side and 6 sticks on the left side, in the middle a reservoir or bucket of nutritional water is placed in the middle. Use one machine to raise the water. Furthermore, the side of the pipe is perforated according to the size of the net pot with a distance of 15 cm between the holes, so that there are 240 planting holes. Make a lightweight steel frame for laying the pipe attached to the yard fence as well as the frame for attaching the roof. Using a grooved plastic roof aims to reduce sunlight and avoid plants from rainwater. Next, install the pipe connection at each end so that it forms an interconnected system (there is an inlet and outlet), then install the water pump machine, connect the pipe to the inlet and outlet (water storage container). Test the system using water, making sure it runs smoothly and that every pipe is flowing. If the system is running smoothly, install a net pot in each holeparalon, the NFT system is ready for use (the creation of this hydroponic module was carried out in 2017). At this time only utilizing existing hydroponic buildings. Sowing lettuce seeds on trays using rockwool which is cut into 1.5 x 1.5 cm sizes, one lettuce seed per rockwool. Age 10 days after the lettuce seedlings can be transplanted to the netpot and placed in the hole in the pipe pipe. The provision of water and nutrients with AB Mix in the reservoir is adjusted to the needs of the plants [15]. At the beginning of plant growth, AB Mix nutrition was given 500 ppm, the following week the nutrient administration was increased by 700 ppm and one week before harvest 900 ppm nutrition. The vegetables planted are quite diverse, consisting of lettuce, spinach, kale, pakcoi, kailan, celery. Planting is carried out in stages according to family needs. The seeding was done using rockwool with an average seeding age of 10 days, except for the longer celery plants. Harvest of lettuce is done at the age of 30 days after planting (HST) or 40 days after seeding (HSS).

Plant maintenance is carried out only to control the availability of water and nutrients for two days once, the water used comes from PDAM which has been stored in the tank. These reservoirs and basins are already available for the family's water needs. So, don't use PDAM water, which may contain chlorine. The produce of lettuce for the family's vegetable needs is distributed to neighbours and the rest is sold to the market or to customers who produce kebabs and burgers.

3. Results and Discussion

The performance of hydroponic vegetable cultivation with the NFT system in narrow yards in urban areas with innovative and adaptive technology, where the placement of the hydroponic module is only attached to the yard fence, so that it does not interfere with the activities of both residents and neighbours and the surrounding community (figure 1). Due to the need for these vegetables for the family, seeding and planting are cultivated gradually, so that the harvest period can be done at any time. Likewise, the types of vegetables planted vary according to family needs, such as: kale, spinach, pakcoi, kailan, lettuce, celery and mustard greens. There is also a mint leaf plant to be brewed with hot tea to drink in the afternoon.

The number and types of vegetables grown are not the same, but are based on tastes, preferences and market opportunities if there are excess vegetable yields. There is a tendency for celery, kailan and lettuce to always be planted, because celery is needed by families and neighbours every day, especially as ingredients for making fried rice and soup for baby food and celery not only as a vegetable but also as a medicinal plant, namely boiled and drunk celery leaves. boiled water. While lettuce is a customer who produces kebabs and burgers.
Lettuce is harvested at the age of 30 DAS or 40 DAS, the harvest method is to uproot the plants with rockwool, so that the shelf life is longer when compared to conventional plants, because rockwool is moist and still retains water and nutrients. Some other plants can be planted with multiple harvests, such as celery, kailan, spinach, kale and mint leaves. Harvest celery plants by weaning the leaf stalks at the bottom, while kailan, spinach and kale plants by cutting the bottom of the plant and leaving one or two segments. It is hoped that the segment will grow back new branches or shoots as well as harvest mint leaves by cutting the fresh parts of the plant. The age of celery plants can be up to 9 months, while kale, spinach and kalilan plants only take up to three harvests.

![Figure 1. Cultivation performance of several hydroponic leaf vegetables with NFT system in one reservoir, only attached to the yard fence](image1)

In general, planted vegetables can be transplanted at the age of 10 days after seeding (HSS) to nedpot, except for celery plants that take longer. Vegetable age varies depending on the type of crop. Water spinach and spinach can be harvested after 21 days after planting (HST), the harvest method is cut at the bottom of the stem and leaving two segments. From this segment, new shoots will grow and the next 14 days can be harvested again, this can be done for three harvests and then replaced with new plants. The yield of hydroponic vegetable crops when compared to conventional plants is quite good, green and fresh free of pesticide residues. Because during plant growth there are no disturbances from pests and diseases. Regarding the purchase of hydroponic vegetables at PT Hero Supermarket shows that 53.12% of consumers prefer hydroponic vegetables because they are cleaner, fresher and guaranteed quality [13]

The cultivation of hydroponic vegetable plants in this narrow yard, not only gives results to the occupants of the house but also has an impact on neighbours and the passing community as well as education and dissemination media for writers so that the use of yards with hydroponic vegetable cultivation can be implemented by the community. Vegetable production or yields are not only for family needs but also distributed to neighbours and communities (figure 2)

![Figure 2. The results of hydroponic vegetables are shared with neighbours and some are sold mainly to customers who produce burgers and kebabs](image2)
The cultivation of hydroponic vegetables in the yard of the house has an impact on neighbours, co-workers and also on the community at. Among them are those who ask questions, discuss and even ask for direct learning how to cultivate hydroponic vegetables, either using used materials such as mineral water bottles, derijen, Styrofoam boxes or using Parallon pipes. Some lessons like this are carried out directly at home and some are carried out in residents’ homes in groups (figure 3).

Figure 3. Training on hydroponic vegetable cultivation, using Parallon pipes and used materials that are cheap and easy to get

Food security is not only about food sufficiency, but also about the ability to produce food by yourself using local resources, so planting during the Covid-19 period is indeed a smart solution to overcome any food crisis that may occur. The period of the Covid-19 pandemic forced everyone to stay at home to break the chain of spreading the virus. The availability of foodstuffs is one of the problems in the current Covid-19 pandemic conditions, both in the new normal and post-Covid-19 to come. The need for food continues to increase while its production and distribution are experiencing obstacles. Nutritious food is one aspect of health that needs attention to maintain endurance. Utilizing yard land as a source of food in a sustainable manner to increase availability, accessibility, utilization, and income. "This is very strategic not only to meet the food and nutritional needs of the family, but also to increase household income, especially in the current pandemic conditions," under current conditions, the use of yard land is truly beneficial [7,16]

The advantages that can be obtained from a hydroponic cultivation system include, not requiring a large cultivation area (efficient place), more hygienic plants because they are not contaminated with soil / soil-borne diseases, minimal or free. Use of chemicals, efficient use of water and fertilizers, practical maintenance and ease in control of plant diseases, yields with higher quality and selling prices. The disadvantages of the hydroponic cultivation system include, it requires substantial initial capital, requires skill and accuracy in making the system, regular maintenance and intensive nutritional input, system errors can result in plant death.

Farming analysis calculations have a different approach to business / project feasibility studies, although both can be used to calculate profits and losses of businesses run by farmers or producers. In a business feasibility study, the investment costs are considered in the calculation of its business, whereas in the farming analysis it does not include investment costs but uses depreciation costs which are included in fixed costs.

In this paper the farm analysis is shown only for lettuce, because lettuce is grown in greater numbers and the crop is already a customer of kebab and burger producers. Meanwhile, other vegetables are used for family needs and some are distributed to neighbours. Lettuce was harvested at the age of 30 DAS or 40 DAS with an average yield range of 110-140 grams per nedpot with an average harvest of 120 grams per nedpot. To facilitate calculations, if the planting of lettuce is carried out at 240 nedpot, the yield of lettuce is 28,800 grams or 28.8 kg at one time. One year there are 8 harvests with a selling price of 20,000 IDR to 45,000 IDR with a dominant selling price of 25,000 IDR
Table 1. Fixed costs of hydroponic lettuce cultivation with NFT systems

| Description                        | Volume | Price (IDR) | Total (IDR) | Residual Value (IDR) | Economical Age (Per Harvest) | Depreciation (IDR) |
|------------------------------------|--------|-------------|-------------|----------------------|-------------------------------|--------------------|
| Fixed cost                         |        |             |             |                      |                               |                    |
| Vinilon Parallon pipe 3           | 8 sticks | 72,000      | 576,000     | 57,600               | 80                            | 6,480              |
| Vinilon 2.5 Parallon pipe derivative | 1 stick    | 53,000      | 53,000      | 5,300                | 80                            | 596.25             |
| Elbow 2.5                          | 16 pieces | 9,000       | 144,000     | 14,400               | 80                            | 1,620              |
| Glue                               | 2 pieces | 5,000       | 10,000      | 1,000                | 80                            | 112.5              |
| Taso mild steel                    | 5 pieces | 75,000      | 375,000     | 37,500               | 80                            | 4,218.75           |
| White grooved plastic roof         | 5 pieces | 80,000      | 400,000     | 40,000               | 80                            | 4,500              |
| Nail gun                           | 1 box   | 60,000      | 60,000      | 6,000                | 80                            | 675                |
| Water pump machine 40 what         | 1 piece | 150,000     | 150,000     | 15,000               | 80                            | 1,687.5            |
| 20 litter plastic buckets          | 1 piece | 132,000     | 132,000     | 13,200               | 80                            | 1,485              |
| Flannel                            | 1 m     | 17,500      | 17,500      | 1,750                | 80                            | 196.87             |
| Ned pot                            | 240 pieces | 450,000  | 108,000     | 10,800               | 80                            | 1,215              |
| Worker wages                       | 2 OH    | 100,000     | 200,000     | 20,000               | 80                            | 2,250              |
| **Total**                          |         |             | **2,320,000** |                      |                               | **26,296.87**      |

This study uses data in one planting period, namely the month of the Covid-19 pandemic from March to August 2020. Production costs are costs incurred by farmers for the production process of their business, starting from processing the land until it is ready to be sold. Production costs include fixed costs and variable costs.

Table 2. Farming analysis of hydroponic lettuce with NFT system

| Description                               | Volume | Price (IDR) | Amount (IDR) |
|-------------------------------------------|--------|-------------|--------------|
| Variable costs                            |        |             |              |
| AB mix nutrition                          | 1 package | 30,000     | 30,000       |
| Lettuce seeds                             | 1 sachet | 25,000     | 25,000       |
| Labour wages                              | 2 persons | 50,000     | 100,000      |
| **Total variable costs for 1 harvest (40 days)** |        |             | 155,000      |
| **Total variable costs for 8 harvests (1 year)** |        |             | 1,240,000    |
| Amount (fixed cost + variable cost) 1 harvest |        |             | 181,297      |
| **Total (fixed cost + variable cost) 8 harvests** |        |             | 1,450,376    |
| Receipt / yield of lettuce 1 harvest (40 days) 240 nedpot x 120 grams | 240   | 28,800      | 720,000      |
| Receipts / yields of lettuce 8 times the harvest (1 year) | 8 times | 230,400      | 5,760,000    |
| Benefits of 1 harvest (40 days)           |        |             | 538,703      |
| Gain 8 times harvest (1 year)             |        |             | 4,309,624    |
| B / C ratio                              |        |             | 2.97         |
| R / C ratio                              |        |             | 3.97         |
Fixed costs are costs incurred regardless of the size or size of production [17]. Fixed costs incurred in lettuce farming using the NFT hydroponic system is 2,320,000 IDR. Fixed costs include materials and tools that can be used multiple times, such as pipes, water pumps, plane, and nedpot with a depreciation of 26,296.87 IDR or if rounded off, it is around 26,297 IDR (table 1).

Variable costs are costs incurred depending on the size or size of production. Variable costs include AB mix nutrition, seeds, and labour wages with a total cost of 1,240,000 IDR with a production of 230,400 kg of lettuce for one year of 8 times production. The total cost of hydroponic system lettuce farming is all costs incurred in the farming process. Farming costs consist of fixed costs and variable costs. To calculate the total cost or TC (Total Cost) is to add fixed costs and variable costs, here are the total costs incurred by hydroponic system lettuce farming. So that the total cost of 1,450,376 IDR is obtained in one year of farming production.

Revenue from hydroponic lettuce farming is calculated by multiplying the amount of lettuce production by the price of lettuce / bunch. The production of lettuce in one harvest is 28,800 kg of lettuce at a price of 25,000 IDR per kg. So that if the volume of production is multiplied by the price, the revenue is 720,000 IDR. During one year, the total revenue was 5,760,000 IDR with 8 harvests in one year. The profit is the difference between the revenue earned minus the total costs that have been incurred in the lettuce farming process with the hydroponic system. To find out the income, the revenue is reduced by the total cost that has been incurred, which is 181,297 IDR so that in one harvest, a profit of 538,703 IDR. During one year, a profit of 4,309,624 IDR.

To see the feasibility of farming, the calculation of B / C Ratio and R / C Ratio is done. The Benefit Cost Ratio (BC Ratio) method is a comparison between the present value of the income obtained from an investment with the present value of expenses (costs) as long as the investment takes place within a certain period of time. Obtained a B / C ratio of 2.97, which means that the B / C ratio is > 1, then the business should be continued. Meanwhile, the R / C ratio is an analytical method to measure the feasibility of a business using the ratio of revenue (revenue) and costs (cost). Business feasibility analysis is used to measure the return on business in applying a technology. The R / C ratio obtained is 3.97, which means that R / C > 1 means that the hydroponic farming is declared profitable.

4. Conclusions
Cultivating plants using a hydroponic system is able to answer food problems, especially vegetables during the Covid-19 pandemic. The use of yard land can save family expenses, increase income and serve as a source of protein and nutrition that is ready to be used at any time. The use of yards for hydroponic vegetable cultivation is able to provide inspiration, motivation and education as well as various vegetable products with neighbours and the community. The analysis of farming costs includes a profit of 538,703 IDR per harvest and 4,309,624 IDR per year for 8 harvests. This farming deserves to be continued and is profitable. National food security starts from household food security, if every household has used the yard for cultivating vegetable crops, then the concern about food shortages, especially vegetables can be overcome.

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