Natural Resources for Human Health
eISSN: 2583-1194

Original Research
Received 19 May 2026
Revised 02 July 2026
Accepted 14 July 2026

Natural Resources for Human Health 2026, Vol.6(12s):1493–1504

KEYWORDS:
Feasibility, Greenhouse, Melon, Sensitivity

Economic Analysis of Melon Cultivation in Greenhouse in Semarang, Central Java, Indonesia

Dinda Ayu Sekarnurani[1], Muthia Auralia[2], Agus Setiadi[3*]

[1]Faculty of Animal and Agricultural Sciences, Universitas Diponegoro, Semarang, Indonesia, 50275
*Correspondent Author: agus_setiadi2006@yahoo.co.id

ABSTRACT: Melons are horticultural crops grown in tropical regions with strong market potential, as it is highly demanded by consumers and offers substantial economic value. Nowadays, melons are widely cultivated in greenhouses using hydroponic systems to adapt to climate change. Since the climate change has become a major challenge to agricultural sector, it is important to assess the sustainability of an innovation, in this study, melon cultivation in a greenhouse. The sustainability of a business can be predicted through economic analysis and sensitivity analysis. This study aimed to analyze the economic aspects of cultivating "Sweet Aprilia" melons in a 400m2 greenhouse (GH) with a capacity of 1,000 melons. This study also aimed to determine the sensitivity or how businesses respond to changes in production costs and selling prices of melons. The research was conducted in Semarang, Central Java. The fertilizer used was an AB mix fertilizer formulated according to the needs of the plants. Each plant was cultivated to produce only two melons to optimize the nutritional intake for each melon, with the PPM adjusted to the needs of the melons. The feasibility and sensitivity analysis were Net Present Value (NPV), Payback Period (PP), Profitability Index (PI), and Internal Rate of Return (IRR). The results showed that a greenhouse containing 602 premium Sweet Aprilia melon plants requires an initial investment of IDR 80,000,000 with an economic life of 5 years. The cost of melon sold (CMS) was IDR 9,967, the BEP was 440 units, and the production cost was IDR 9,966,600. Revenue was IDR 17,500,000, so the income was IDR 7,533,400. This study produced an NPV of 54.67, PP of 2 years, 7 months, 16 days, PI was 1.68, and IRR was 37.03. The findings highlight that the melon business in a GH is feasible to be carried out with a cultivation process for 4 planting periods per year. Despite rising production costs and declining selling prices, melon business is projected to maintain a positive respond by continuing to generate profits for the business.

1. INTRODUCTION

The global population is expected to keep growing over the next 50 years, including the population growth in Indonesia that was projected to reached 328,93 million people by 2050 [1], [2]. This reality poses a significant challenge for agricultural production to meet the needs of a growing population while adhering to achieve the goal no 2 of Sustainable Development Goals (SDGs) or "*end hunger, achieve food security and improved nutrition and promote sustainable agriculture*". Food availability, diversity, and sustainability are some of the aspects that needs to be fulfilled to achieve food security [3][4]. One approach to achieve food security is by increasing production and consumption within the horticultural sector. Melons (*Cucumis melo L.*) play an important role in Indonesia's horticultural sector. Central Java is the second largest producer of Melon after East Java in Indonesia. Melon production experiences fluctuations but demonstrates an upward trend, driven by growing recognition of its nutritional and economic benefits. Climate change contributes to the decline in melon production, leading to several adverse effects, including a rise in pest and disease infestations. Additionally, prolonged dry seasons drive up production costs. To date, melons have been cultivated in greenhouses using hydroponic system. Greenhouses can prevent insects and fungi from mitigating climate change and offers significant advantages over traditional outdoor cultivation methods. A greenhouse shields crops from adverse weather conditions and provides a controlled environment suitable for plant growth by regulating its internal microclimate [5]. The primary goal of hydroponic melon cultivation is to deliver safe, high-quality melons that support consumer health. Hydroponic method offers the advantage of producing melons with a consistently sweet and fresh flavour all year round [6].

Melon cultivation in greenhouse offers various potential advantages for human health through improvements in food safety, melon's nutritional quality and the consistency of fresh melon availability. Controlled environments of greenhouse allow farmers to regulate essential production factors, including temperature, humidity, irrigation, plant density, and nutrient supply, which may affect in more consistent melon development and nutritional quality. Recent study has shown that melon cultivated under greenhouse system can produce fruits with enhanced concentrations of phenolic and flavonoids, thereby improving their nutraceutical potential [7]. According to food safety perspective, greenhouse cultivation may also reduce crop exposure to adverse weather conditions. The physical protection of greenhouse system can potentially decrease pest pressure and reduce farmer's dependence on chemical pesticides when appropriate cultivation and integrated pest management are implemented [8]. Evidence from Indonesian melon cultivation shows that greenhouse implementation has the potential to reduce chemical fertilizer and pesticide use, although reduction may vary according to farm management practices [9].

Given that climate change has emerged as a significant challenge for the agricultural sector, evaluating the sustainability of melon cultivation in a greenhouse is essential. With the continuous rise in food demand driven by population growth, enhancing agricultural production and ensuring its long-term sustainability is necessary. Business sustainability can be assessed through both economic and sensitivity analyses [10] [11][12]. Economic analysis is important in the greenhouse cultivation of agricultural corps. In business development, financial feasibility plays a critical role in determining the continuation of an investment. A business is considered viable when it is capable of generating sufficient returns for both investors and the entrepreneur [13]. Moreover, business sustainability is inherently linked to the sensitivity of its feasibility. Sensitivity analysis serves to predict how a business responds to variations in key parameters, thereby indicating its capacity to endure under specific conditions. Consequently, conducting sensitivity analysis on factors influencing business feasibility is essential for ensuring continuity and minimizing the risk of failure [14]. Parameters that can change and influence the feasibility of a business include production costs and the selling price of a product.

Previous research findings indicate that melon cultivation in a greenhouse demonstrates strong potential for business feasibility [15], [16], [17]. However, limited research has integrated business feasibility analysis with sensitivity analysis for melon cultivation in a greenhouse, particularly considering rising production costs and declining selling prices. This analysis aimed to evaluate the economic feasibility and potential profitability of melon production in controlled greenhouse environment. By examining factors such as initial investment, operational costs, yield projections, and market demand, this study provides valuable insights for farmers and investors considering greenhouse melon cultivation in Indonesia. This study aimed to conduct an economic and sensitivity analysis of melon cultivation in a greenhouse.

2. MATERIALS AND METHODS

2.1 Location Site

This study was conducted in a melon greenhouse (GH) in Mijen, Semarang City, Central Java, Indonesia. The melon GH measures 10 × 40 m and can hold up to 602 polybags. The research was conducted on May 12th until July 17th, 2025 for around two months. The GH is made of bamboo with a UV-protected plastic roof and insect netting. The melon variety grown in GH is "Sweet Aprilia". The GH used a drip irrigation system to water the melon plants. Each melon plant was managed to yield only two melons, ensuring optimal nutrient allocation for each fruit, with the PPM adjusted according to the melons' requirements. The fertilizer used was AB Mix with the composition shown in Table 1. The study was conducted from the day after cultivation (DAC 0 – DAC 65).

Fertilizer

The synthetic nutrient commonly used in hydroponic cultivation is known as AB Mix. AB Mix is a nutrient solution composed of two parts: solution A, which provides macronutrients, and solution B, which supplies micronutrients [18]. The melon cultivation in this research used was an AB mix fertilizer, which was made and formulated as shown in table 1 and Table 2.

Table 1. Composition of AB mix used in Greenhouse

No	Items	Percentage (%)
1	N-NO3	18.6
2	N-NH4	0.8
3	P	8.5
4	K	42.5
5	Ca	14.2
6	Mg	4.3
7	S	9.9

Table 2. PPM content of Fertilizer

No	Items	PPM content
1	Fe	4
2	B	0.5
3	Mn	0.5
4	Zn	0.19
5	Cu	0.19
6	Mo	0.05
7	Na	0.018
8	Cl	0.65
9	Ni	0.015
10	Co	0.015
11	I	0.05
12	V	0.001
13	Ag	0.001
14	Bio	2.5

Figure 1. Melon Greenhouse

2.2 Data Collection

The primary data was obtained by observing 602 melon plants in a greenhouse during the 65 to 70 days cultivation period. The harvest is estimated to reach approximately 1,200 fruits, as each melon plant is cultivated to produce only two melons. Following the harvest, the greenhouse undergoes sterilization for one to two weeks to ensure the subsequent cultivation is free from potential disease. Consequently, a single greenhouse can accommodate four production cycles annually. Meanwhile, secondary data was obtained from trusted sources related to this research.

2.3 Analytical Methods

Cost of production (IDR)

Production costs are all expenses incurred to cultivate melons in a greenhouse. Production costs are calculated starting from GH depreciation and operating costs. These operating costs included the expenditures for seeds, water, electricity, insecticide and fungicide, fertilizer, labor and other production related costs. GH depreciation is derived from the greenhouse investment cost or the initial expense to established a bamboo greenhouse including a greenhouse and supporting tools for hydroponic melon cultivation. This investment was depreciated over their respective economic lives and incorporated into the annual production cost. The cost of melon produced (CMP) and the break-even point (BEP). The economic performance of melon production in greenhouse was evaluated by calculating the Revenue, Income, and the feasibility ratio including Net Present Value, Payback Period, Internal Rate of Return and sensitivity analysis.

Revenue (IDR)

Revenue is calculated by multiplying the total weight of harvested melons (kg) by the selling price per kilogram of melons. The selling price per kilogram is IDR 25,000. The total weight of harvested melons was based on the number of plants cultivated per production cycle and the expected survival rate.

Income

Income is the subtraction of revenue from production costs. Income = revenue − cost of production

$$\pi = TR - TC$$

Feasibility analysis

The feasibility analysis was conducted over a 5-year economic life (corresponding to the GH's lifespan). Each year is assumed to have four periods of planting. The feasibility analysis used Net Present Value (NPV), Payback Period (PP), Profitability Index (PI), and Internal Rate of Return (IRR).

Ner Present Value (NPV)

NPV was calculated to evaluate the business's profitability over multiple years, considering the fluctuations in currency value.

$$NPV = \sum_{t=1}^{n} \frac{Bt - C_t}{(1+i)^t}$$

Decision rule for NPV is as follows:

Negative NPV (NPV < 0) means that the business was not feasible if the costs were greater than the benefits.

Positive NPV (NPV > 0) means that the business was feasible if the benefits were greater that the costs.

Payback Period (PP)

PP is used to analyze financial feasibility by determine the time needed to return the investment through the business. A business is feasible if the payback period is less than the business's economic lifespan. PP formula is as follows:

$$PP = \frac{(initial\ invesment)}{(net\ cash)} \times 1\ year$$

Internal Rate of Return (IRR)

$$IRR = \sum_{t=1}^{n} \frac{Bt \ - Ct}{(1 \ + IRR)^t} = 0$$

Where:

Bt = income of year t

Ct = expenditure or cost of year t

i = interest rate

t = year of ongoing business

n = year

Decision rule for IRR is as follows:

If IRR > interest rate, the business is feasible

If IRR < interest rate, the business is not feasible

Sensitivity analysis

In this study, sensitivity analysis was performed using the switching value method to examine how changes in production costs, selling prices, and the combination of production cost and selling price affect business feasibility indicators (NPV, PP, PI, IRR). Sensitivity analysis was conducted by assuming a 10% increase in production costs, a 10% decrease in melon selling prices and a 10% increase in production costs and a 10% decrease in melon prices.

3. RESULTS AND DISCUSSION

3.1 Results

This research conducted intensive monitoring of melon cultivation in a greenhouse. The greenhouse monitoring involves the continuous monitoring of temperature, water supply, and fertilizer supply inside a greenhouse. Melon (*Cucumis melo L.*) is one of the most significant horticultural crops, rich in carbohydrates and essential nutrients [19]. As the plants and fruits growing bigger the needs of water was also increasing. Melon, a water-loving crop, is highly sensitive to soil moisture, and water availability directly impact on fertilizer efficiency [20]. As shown in Table 3. total water used to cultivate melon was 111,882 liter. In hydroponic systems, watering volume is a crucial factor, as sufficient water and nutrient availability are vital for attaining optimal plant quality [21]. It is necessary to maintain a consistent watering volume of each melon plant until harvest for the growth and quality of melons [22].

Table 3. Amount of Water

No	Day after cultivation (DAC)	Total (liter)
1	0-10 DAC	6,762
2	11-20 DAC	13,320
3	21-30 DAC	20,400
4	31-65 DAC	71,400
	Total	111,882

Temperature is among the most critical factors influencing the greenhouse climate. The GH was constructed of bamboo with a UV-protected plastic roof and insect netting to make it easier to control the temperature required by melon plants. Transparent material roof helps on balancing nighttime temperatures by raising the ambient temperature in the greenhouse [23]. GH temperature throughout 65 days of melon cultivation is as shown in Table 4. The temperature in the greenhouse was around of 25^{o}C – 42^{o}C with the highest mean of 38^{o}C. The temperature was higher than the required temperature for melon cultivation that was around 25^{o}C – 30^{o}C [24].

Table 4. Temperature of Greenhouse

No	Day after cultivation (DAC)	Min (^{0}C)	Mean (^{0}C)	Max (^{0}C)
1	0-10 DAC	25	38	42
2	11-20 DAC	25	36	42
3	21-30 DAC	25	36	40
4	31-65 DAC	25	37	42

The preparation of AB Mix solutions was carried out by adding 5 ml of stock A and stock B into 1 litter of water, then stirring thoroughly. The amount of AB mix solution given to the melon plants throughout 65 day of melon cultivation is as presented in table 5. The application of AB Mix fertilizer continues to increase in line with the cultivation days, this is because the melon plants are getting bigger and need more nutrients intake, especially for the fruit. A previous study showed that melon plants start to generate fruit ranging from day 28 to 35 after cultivation [25]. Therefore, increasing the provision of AB Mix fertilizer is very important to support the development of large and high-quality melon fruit. The generative stage, particularly fruit weight, is greatly affected by the plant's absorption of macronutrients (N, P, K, Ca, Mg, and S) and micronutrients (Cu, Zn, Fe, B, Mo, Mn, Cl) [26], [27].

Table 5. Number of fertilizer (AB mix)

No	Day after cultivation (DAC)	Total (liter)
1	0-10 DAC	55
2	11-20 DAC	110
3	21-30 DAC	160
4	31-65 DAC	506
	Total	831

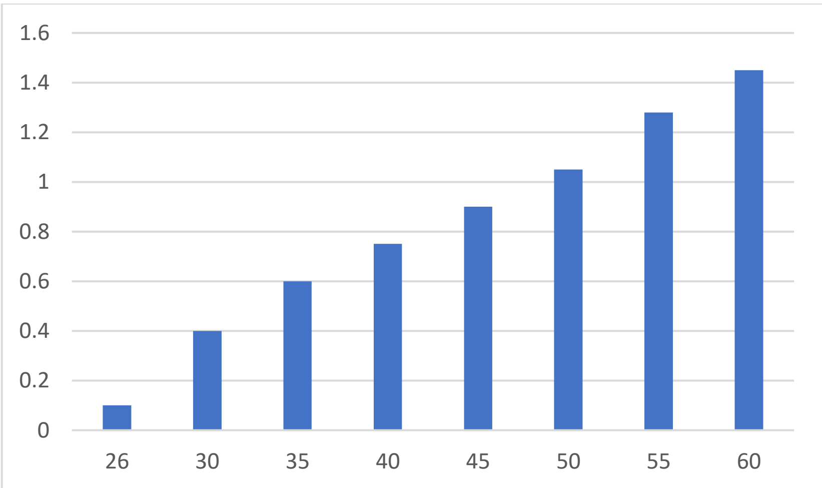

Figure 2. Melon fruit growth (DAC)

Figure 3. Melon "Sweet Aprilia" was harvested

3.4 Discussion

Investment

The GH is constructed of bamboo and measures 10 × 40 m from east to west. The plants are irrigated using drip irrigation, and the polybags use cocopeat as the medium. Total construction cost of GH was IDR. 80,000,000. Investment in hydroponic melon cultivation includes the need to build a greenhouse and supporting tools for hydroponic melon cultivation [28], [29].

Economic Analysis

The cost production analysis of "Sweet Aprilia" Melon cultivation in a greenhouse was presented in Table 6. This study calculated fixed and variable cost as cost of production. Fixed cost consisted of greenhouse depreciation. While the variable cost included the cost of seed, fertilizer, labour, pesticides (insecticide, fungicide, and leave fertilizer), electricity, water and other cost. This is supported by previous study [30], [31], which states that variable cost in melon cultivation especially in greenhouse included the cost of materials such as fertilizers, fungicides, insecticides, and single-use equipment required for one planting cycle. The component with largest component in total cost production is worker cost, contributed for almost half of the total cost or around 43.34%. This finding aligns with previous study which found that labour costs represented the largest proportion of the total cost in agricultural corps cultivation [32], [33]. The cost of labour was the highest because labour is an important resource in the agricultural sector. Agricultural industry depends heavily on a substantial workforce to operate and produce food as well as other agricultural products [34]. The second highest cost of variable cost was fertilizer cost. Contrary to the cost of labour and fertilizer as the two highest cost, the electricity cost was the lowest of variable cost in this study. Electricity cost contributed 2.51% of the total cost or around IDR 250,000. The electricity was only used to operate the water pump to irrigate the plants and to light the greenhouse at nighttime. Electricity is a supporting aspect in greenhouse operations [35]. The breakeven point (BEP) unit for melon cultivation in a greenhouse in Semarang is 440 units, meaning that the business experience neither profit nor loss when producing or harvesting 440 melons.

Table 6. Cost of Production melon sold

Items	Number	Price	Total	%
Seed (IDR)	1000	1,170	1,170,000	11.74
Fertilizer cost (IDR)	831	3,600	2,991,600	30.02
Worker cost (IDR)	1	4,320,000	4,320,000	43.34
Insecticide, Fungicide, leave fertilizer cost (IDR)	1	300,000	300,000	3.01
Electricity cost (IDR)	1	250,000	250,000	2.51
Water cost (IDR)	1	335,000	335,000	3.36
Others cost (IDR	1	600,000	600.000	6.02
Total			9.966.600	100.00
Number of melon (units)	1,000			

Cost of Melon sold (IDR)	9,967	
BEP (units)	440	

Each plant produced two fresh melons to optimize nutrients intake and the growth. Melon harvested weight averaging between 1.2 to 1.8 kg in weight as shown in Figure 3, with a harvest success rate of 75%, resulting in a total yield of 756 premium melons. Fruit weight is influenced by several factors, including light, temperature, nutrient availability, and pest attacks [36]. Assuming that the total production is 700 kg per harvest season, with a selling price of IDR 25,000 per kilogram. The study found that the revenue, production cost, and income as presented in table 7. The revenue was obtained from number of melons harvested (kg) sold multiply with the selling price per kilogram and resulted in total revenue of IDR 17,500,000. Revenue is calculated by subtracting the total production costs from the total receipts generated during the production process [37]. The income of melon cultivation was derived from revenue subtracting with production cost or around IDR 7,533,400 per harvest season.

Table 7. Income analysis

No	Items	Number
1	Revenue (IDR)	17,500,000
2	Production cost (IDR)	9,966,600
3	Income (IDR)	7,533,400
	Total melon harvested (heads)	756

Feasibility Analysis

The feasibility analysis was conducted to assess the potential success and sustainability of the greenhouse melon business. Key tools used in this analysis were Net Present Value (NPV), Payback Period (PP), Profitability Index (PI) and Internal Rate of Return (IRR), as presented in Table 8. The initial investment was IDR 80,000,000 to constructed a 400 square meter bamboo greenhouse with a UV-protected plastic roof, insect netting, polybag and cocopeat as the medium, and drip irrigation system. Investment in hydroponic melon cultivation includes the need to build a greenhouse and supporting tools for hydroponic melon cultivation [29] [28]. This study showed that the Net Present Value (NPV) was 54.67. NPV value > 0 which means that the net income from melon cultivation in a greenhouse is greater than the total production costs incurred. This finding aligns with previous study which showed that melon cultivation in a greenhouse is feasible to be carried out [6], [28]; the payback period was 2 years, 7 months 16 days means that the return on investment for melon cultivation in greenhouse is less than the economic lifespan of 5 years. This research has a relatively faster payback period when compared with the economic lifespan and the findings of previous researches that need around 5 years for the investment to return [38], [39]; the profitability index (PI) of melon cultivation in a greenhouse in this study was 1.68. The profitability index represents the ratio between the total present value of net receipts and the present value of investment expenditures over the investment's lifespan. The PI value greater than 1 indicates feasibility [6]; the IRR was 37.03% or greater than the prevailing bank interest rate of 12%. If the calculated IRR exceeds the discount rate, the investment can be considered worthwhile [5], [40]. All the economic feasibility indicator (NPV, PP, PI, and IRR) showed that the melon cultivation in a greenhouse is economically feasible to run.

Table 8. Feasibility analysis

No	Item	Number
1	Investment (IDR)	80,000,000
2	Net Present Value (NPV)	54.67
3	Payback period	2 years, 7 months 16 days
4	Profitability index (PI)	1.68
5	IRR (%)	37.03

Sensitivity Analysis

Sensitivity analysis was carried out to determine how changes may affect the results of feasibility indicator like NPV, PP, PI, and IRR. Due to possible changes in essential aspect such as increasing in production cost and decreasing in melon selling price, this analysis is necessary in order to evaluate the business [13]. The sensitivity analysis of melon cultivation in a greenhouse in Semarang is as shown in Table 9, with three different conditions. The study found that a 10% increase in production costs, a 10% decrease in selling prices, and a combination of these two conditions caused a decrease in the feasibility indicators. However, melon cultivation in a greenhouse remains feasible because the NPV > 0, PP is smaller than the economic life, PI is greater than 1, and IRR > than the interest rate [6], [28], [40]. This result was aligned with the previous study by [13], [39] which found that melon cultivation in greenhouse is still feasible even though there were changes in cost production and selling price.

Table 9 Sensitivity analysis

No	Item	Increasing 10% of production cost	Reducing 10% of melon price	Increasing 10% of production cost and reducing 10% of melon price
1	Net Present Value (NPV)	41.84	29.01	16.18
2	Payback period	2 years, 11 months and 12 days	3 years, 4 months, 4 days	3 years,11 months, 8 days
3	Profitability index (PI)	1.52	1.36	1.20
4	IRR (%)	31.50	25.80	19.88

Despite the economic performance analysed in this research, several uncertainties should be considered when interpreting the study results. The feasibility of melon production in a greenhouse might be influenced by the fluctuation in melon market prices and changes in the expense of essential production inputs, such as seeds, fertilizers, pesticides, water and labour. In addition, greenhouse maintenance cost may vary over time depending on the condition of the greenhouse and local environmental weather. Although greenhouse production provides a more controllable cultivation environment, melon productivity may still be affected by other aspects such as differences in temperature, irrigation, nutrient management, humidity, as well as disease and pest incidence. Furthermore, the economic and cultivation performance estimated in this research may vary across greenhouse location and production seasons. The differences in climate condition, labour cost, market condition, greenhouse system, management practice, and access to inputs may affect production cost, yields and profitability of a business. Hence, the results should be interpreted within the context of the assumptions and cultivation conditions considered in this research and should not necessarily be generalized to all melon production using greenhouse system.

4. CONCLUSION

Based on the research results, it shows that the melon business with a GH size of 10x40 m is profitable. All the economic feasibility indicator (NPV, PP, PI, and IRR) showed that the melon cultivation in a greenhouse is economically feasible to run for 4 planting periods per year. Sensitivity analysis shows a 10% increase in production costs, a 10% decrease in melon prices and a combination of a 10% increase in production costs and a 10% decrease in melon prices still provide profits for the melon business. Despite rising production costs and declining selling prices, melon business is projected to maintain a positive respond by continuing to generate profits for the business.

ACKNOWLEDGEMENTS

Lorem ipsum dolor sit amet, consectetur adipiscing elit. The authors acknowledge the technical assistance provided by the Department of Natural Resources.

AUTHOR CONTRIBUTIONS

Agus Setiadi: Conceptualization, Investigation.

Dinda Ayu Sekarnurani: Methodology, Writing

Muthia Auralia: Supervision, Review & Editing.

CONFLICT OF INTEREST

All authors declare that there is no conflict of interest.

ETHICS STATEMENT

Ethical approval was not applicable for this study.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this research are available from the corresponding author upon reasonable request.

REFERENCES

[1] United Nations, "Global Issue: Population," https://www.un.org/en/global-issues/population.

[2] Central Bureau of Statistics, *Proyeksi Penduduk Indonesia 2020 - 2050 Hasil Sensus Penduduk 2020*. Jakarta: BadanPusatStatistik, 2023.

[3] FAO, *The State of Food Security and Nutrition in the World 2025*. Rome: FAO; IFAD; UNICEF; WFP; WHO;, 2025. doi: 10.4060/cd6008en.

[4] J. Clapp, W. G. Moseley, B. Burlingame, and P. Termine, "Viewpoint: The case for a six-dimensional food security framework," Jan. 01, 2022, *Elsevier Ltd*. doi: 10.1016/j.foodpol.2021.102164.

[5] F. García-Espinoza, M. Yousef-Yousef, M. J. García del Rosal, M. Cuenca-Medina, and E. Quesada-Moraga, "Greenhouse melon crop protection and production through the compatible use of a parasitoid with endophytic entomopathogenic ascomycetes," *J. Pest Sci. (2004).*, vol. 97, no. 4, pp. 1899–1912, Sep. 2024, doi: 10.1007/s10340-023-01735-0.

[6] N. Fitriani, D. Ciptaningtyas, A. Thoriq, and L. H. Pratopo, "Input-Output energy analysis and financial feasibility of cherry tomato production in PT X greenhouse at Pangalengan, West Java, Indonesia," *Sustainable Energy Technologies and Assessments*, vol. 77, May 2025, doi: 10.1016/j.seta.2025.104311.

[7] M. U. Nuha, A. Setiadi, and T. Ekowati, "Feasibility Analysis of Hydroponic Melon Business at PT. Agro Bergas Sejahtera, Bergas Subdistrict, Semarang Regency," *Quantitative Economics and Management Studies*, vol. 5, no. 1, pp. 91–99, Dec. 2023, doi: 10.35877/454ri.qems2178.

[8] A. Borrelli *et al.*, "Greenhouse Vertical Cultivation to Improve Production Earliness and Fruit Yield and Quality of Melon," *Plants*, vol. 15, no. 4, Feb. 2026, doi: 10.3390/plants15040562.

[9] V. Mahdavi *et al.*, "Pesticide residues in green-house cucumber, cantaloupe, and melon samples from Iran: A risk assessment by Monte Carlo Simulation," *Environ. Res.*, vol. 206, p. 112563, Apr. 2022, doi: 10.1016/j.envres.2021.112563.

[10] N. Hanani *et al.*, "DOES THE ADOPTION OF GREENHOUSES REDUCE THE USE OF PESTICIDES AND CHEMICAL FERTILISERS? EVIDENCE FROM INDONESIAN MELON FARMERS," *J. Sustain. Sci. Manag.*, vol. 20, no. 7, pp. 1375–1385, Jul. 2025, doi: 10.46754/jssm.2025.07.003.

[11] M. Taki, R. Abdi, M. Akbarpour, and H. G. Mobtaker, "Energy inputs - yield relationship and sensitivity analysis for tomato greenhouse production in Iran," *Agric Eng Int: CIGR Journal*, vol. 15, no. 1, pp. 59–67, Apr. 2013.

[12] N. Kuswardhani, P. Soni, and G. P. Shivakoti, "Comparative energy input-output and financial analyses of greenhouse and open field vegetables production in West Java, Indonesia," *Energy*, vol. 53, pp. 83–92, May 2013, doi: 10.1016/j.energy.2013.02.032.

[13] Y. Zhuang, N. Lu, M. Kikuchi, M. Takagaki, and T. Tamashiro, "Productivity potential and economic feasibility of small-sized tomato production in plant factories with artificial lighting: A comparative study with high-tech greenhouse production," *J. Clean. Prod.*, vol. 470, Sep. 2024, doi: 10.1016/j.jclepro.2024.143171.

[14] L. Nuzuliyah, A. Widodo Balai Besar Pelatihan Pertanian Ketindan, D. Pertanian dan Perkebunan Kabupaten Kediri, and S. Artikel, "Analisis Kelayakan dan Sensitivitas Usaha Budidaya Melon Golden Premium: Implementasi Sistem Low Cost Smart Greenhouse Feasibility and Sensitivity Analysis of Premium Golden Melon Cultivation Business: Implementation of Low-Cost Smart Greenhouse System I N F O A R T I K E L," vol. 8, no. 2, pp. 65–76, 2024, doi: 10.51589/ags.v8i02.3822.

[15] Y. N. Wakhidati, M. Sugiarto, H. Aunurrohman, S. Mastuti, and J. A. Suryani, "Farming Sustainability: A Sensitivity Analysis," in *IOP Conference Series: Earth and Environmental Science*, Institute of Physics, 2022. doi: 10.1088/1755-1315/1041/1/012080.

[16] N. M. Zifa, A. Zaini, and S. Husni, "Analisis Kelayakan Finansial Agrowisata Golden Melon (Studi Kasus Kelompok Tani Milenial Pesona Alam Desa Wisata Kebon Ayu Kecamatan Gerung Kabupaten Lombok Barat)," *Agrimansion*, vol. 24, no. 2, pp. 346–358, Aug. 2023.

[17] B. Duraivel, N. Muthuswamy, and S. Gnanavendan, "Comprehensive analysis of the greenhouse solar tunnel dryer (GSTD) using Tomato, snake Gourd, and Cucumber: Insights into energy Efficiency, exergy Performance, economic Viability, and environmental impact," *Solar Energy*, vol. 267, Jan. 2024, doi: 10.1016/j.solener.2023.112263.

[18] T. Prasetyo, Purbowo, and S. A. I. Sukma, "Analisis Kelayakan Usaha Budidaya Melon Varietas Fujisawa dengan Sistem Hidroponik (Studi Kasus: Green House R3 Farm Satu Ngimbang Lamongan)," *Sigmagri*, vol. 3, no. 2, pp. 121–130, Aug. 2024.

[19] C. Chairudin, R. Fitria, and E. J. Harahap, "Application of Various Nutrition to the Growth and Production of Melon (Cucumis melo L.) Hydroponic DRFT (Dynamic Root Floating Technique)," *Jurnal Ilmu Pertanian Indonesia*, vol. 29, no. 3, pp. 372–376, Mar. 2024, doi: 10.18343/jipi.29.3.372.

[20] T. Sun, Y. Zhao, D. Zhou, Z. Gao, and X. Hu, "Effects of amount, electric conductivity, and frequency of a nutrient solution on melon yield and flavor quality," *Sci. Hortic.*, vol. 310, Feb. 2023, doi: 10.1016/j.scienta.2022.111737.

[21] F. Zhou, Y. Xu, Y. Nie, and X. Mu, "Substrate-Specific Engineering of Amino Acid Dehydrogenase Superfamily for Synthesis of a Variety of Chiral Amines and Amino Acids," *Catalysts*, vol. 12, no. 4, Apr. 2022, doi: 10.3390/catal12040380.

[22] T. F. Ajitama, A. D. Susila, and W. B. Suwarno, "The Effects of Watering Volume and Topping on the Fruit Quality of Two Melon Varieties in a Substrate Hydroponic System," *J. Trop. Crop Sci.*, vol. 11, no. 02, pp. 165–174, Jun. 2024, doi: 10.29244/jtcs.11.02.165-174.

[23] Z. Yang *et al.*, "Appropriate water and fertilizer supply can increase yield by promoting growth while ensuring the soil ecological environment in melon production," *Agric. Water Manag.*, vol. 289, Nov. 2023, doi: 10.1016/j.agwat.2023.108561.

[24] K. Xu, X. Guo, J. He, B. Yu, J. Tan, and Y. Guo, "A study on temperature spatial distribution of a greenhouse under solar load with considering crop transpiration and optical effects," *Energy Convers. Manag.*, vol. 254, Feb. 2022, doi: 10.1016/j.enconman.2022.115277.

[25] B. Supriyanta, M. Y. Florestiyanto, and I. Widowati, *BUDIDAYA MELON HIDROPONIK DENGAN SMART FARMING*, vol. 1. Yogyakarta: UPNVYogyakarta, 2022.

[26] T. R. Kusparwanti, R. R. D. Pertami, N. Ermawati, S. Suwardi, and A. Salim, "Evaluating the impact of amino acid spray on melon (Cucumis melo L.) growth under hydroponic conditions at Polije SGH," *AGROMIX*, vol. 16, no. 1, Mar. 2025, doi: 10.35891/agx.v16i1.4895.

[27] E. Sugiartini, Rusmana, S. Hilal, A. C. I. Feronica, and S. E. Wahyuni, "The Response of AB Mix Utilization on Growth and Yield of Several Melon Varieties (Cucumis melo L.) in Hydroponic Drip Irrigation System," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing Ltd, Feb. 2022. doi: 10.1088/1755-1315/978/1/012026.

[28] A. N. Huda, W. B. Suwarno, and A. Maharijaya, "Respon Delapan Genotipe Melon (Cucumis melo L.) terhadap Perlakuan KNO3," *Jurnal Hortikultura Indonesia*, vol. 9, no. 2, pp. 84–92, Aug. 2018, doi: 10.29244/jhi.9.2.84-92.

[29] Z. W. Putra, A. Setiadi, and H. Setiyawan, "Analisis Kelayakan Usaha Finansial Budidaya Melon Hidroponik di PT Indigen Karya Unggul," *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, vol. 11, no. 1, pp. 1569–1581, Jan. 2025.

[30] F. Likitswat, "Urban Farming: Opportunities and Challenges of Developing Greenhouse Business in Bangkok Metropolitan Region," *Future Cities and Environment*, vol. 7, pp. 1–10, 2021.

[31] L. Aditya Prayudhi and R. Asmara, "EFFICIENCY OF MARKETING CHANNELS FOR MELON (Cucumis melo L.) IN THE GREEN HOUSE OF BALITAR ISLAMIC UNIVERSITY, BLITAR CITY," *JOSAR (Journal of Students Academic Research)*, vol. 8, no. 1, pp. 136–148, Mar. 2023, doi: 10.35457/josar.v9i1.2777.

[32] F. A. Sagala and R. S. Pirngadi, "THE ANALYSIS REVENUE OF PREMIUM MELON FRUIT FARMERS AT PUSAT PENGUMPULAN HASIL TANAMAN KEKAL PENGELUARAN MAKANAN PERADONG MALAYSIA," *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration*, vol. 3, no. 6, pp. 1817–1823, 2023.

[33] O. S. Subaşı, O. Uysal, and M. A. Kiraci, "Technical efficiency and its determinants in watermelon production in Adana Province, Turkey," *Custos e Agronegocio*, vol. 18, no. 1, pp. 212–228, Mar. 2022.

[34] M. Paled and S. S. Guledagulda, "An Economic Analysis of Hybrid Water Melon Seed Production in Koppal District of Karnataka," *Indian Journal of Pure & Applied Biosciences*, vol. 8, no. 1, pp. 26–31, Feb. 2020, doi: 10.18782/2582-2845.7922.

[35] B.-S. Manolache, S.-C. Simionescu, M. Pila, and S. Stanciu, "Labor Costs in Agriculture: Brief Analysis of the Romanian Sector," *Annals of Dunarea de Jos University of Galati. Fascicle I. Economics and Applied Informatics*, vol. 29, no. 1, pp. 33–40, Apr. 2023, doi: 10.35219/eai15840409317.

[36] F. Fitri, B. A. Ikawanty, A. H. Santoso, and P. S. Harijanto, "Peningkatan Produktivitas Tanaman Melon di Kabupaten Trenggalek, Jawa Timur melalui Integrasi Smart Hidroponik dan PLTS pada Petani Mitra Lokal," *Jurnal Abdi Masyarakat Indonesia*, vol. 5, no. 4, pp. 1297–1304, Jun. 2025, doi: 10.54082/jamsi.1607.

[37] N. Deninta, Kusumiyati, and S. Mubarok, "Respons Hasil dan Kualitas Hasil Unpollinated Tomat Beef Kultivar Umagna terhadap Jenis dan Konsentrasi ZPT (GA3 dan 4-CPA) di Dataran Medium," *Jurnal Agrikultura*, vol. 31, no. 1, pp. 9–14, 2020.

[38] S. Aprile *et al.*, "Techno-economic assessment of benzyl benzoate clean production using conventional heating or microwaves," *Sustain. Chem. Pharm.*, vol. 36, p. 101257, Dec. 2023, doi: 10.1016/j.scp.2023.101257.

[39] M. R. W. P. Pratama, F. Nurainy, L. Indraningtyas, and P. T. Utomo, "ANALISIS KELAYAKAN FINANSIAL MELON INTHANON(STUDI KASUS DI GREENHOUSEPONDOK PESANTRENAL-HIDAYAT GERNING PESAWARAN)," *JURNALAGROINDUSTRI BERKELANJUTAN*, vol. 4, no. 1, pp. 156–168, 2025.

[40] T. I. G. A. BULAN, I. K. B. SUSRUSA, and N. M. C. SUKENDAR, "Analisis Kelayakan Finansial Budidaya Melon pada Rumah Kaca di Kota Denpasar," *Jurnal Agribisnis dan Agrowisata (Journal of Agribusiness and Agritourism)*, vol. 11, no. 1, p. 435, Jul. 2022, doi: 10.24843/JAA.2022.v11.i01.p40.

[41] T. Juwitaningtyas, M. Ushada, and D. Purwadi, "Financial Feasibility Analysis for Moss Greening Material Panel in Yogyakarta," *Agriculture and Agricultural Science Procedia*, vol. 3, pp. 159–162, 2015, doi: 10.1016/j.aaspro.2015.01.031.