Journal of Indonesian Social Science

Vol. 6, No. 9, September 2025
E-ISSN:2723 – 6692
P-ISSN:2723– 6595
http://jiss.publikasiindonesia.id/

Growth and Production of Hydroponic Melon *(Cucumis Melo L.)* Using DFT System with Gandasil B

Oktavianus Tappi', Robianto Tandibayang
Universitas Kristen Indonesia Toraja
Email: oktacvj@gmail.com, robiantotandibayang634@gmail.com

KEYWORDS
Hydroponics, DFT (Deep Flow Technique), Gandasil B, Melon (Cucumis melo L.), Plant Growth, Economic Value.

ABSTRACT
This study aims to identify and evaluate the economic value and production of hydroponic melon cultivation using *Gandasil* B, as well as the effect of its application on hydroponic melon (*Cucumis melo* L.), and to determine the most optimal dosage of *Gandasil* B. The research was conducted at the Greenhouse of the Faculty of Agriculture, UKI Toraja, Tallunglipu Subdistrict, North Toraja Regency, South Sulawesi, from March to June 2025. The method used was a Randomized Block Design (RBD) with four levels of *Gandasil* B treatment: (G0 = control), (G1 = 1.5 cc/liter of water), (G2 = 3 cc/liter of water), and (G3 = 4.5 cc/liter of water). The AB Mix concentration was applied as follows: 0–7 days after planting = 500 ppm; 8–14 days after planting = 750 ppm; 15–21 days after planting = 1000 ppm; 22–28 days after planting = 1250 ppm; 29–35 days after planting = 1500 ppm; and from 36 days until harvest = 2000 ppm. Observation variables included plant height, number of leaves, leaf diameter, number of branches, number of flowers, fruit diameter, fruit weight, and fruit weight per plot. Data were analyzed using analysis of variance (ANOVA) for RBD and followed by the Honestly Significant Difference (HSD) test at a 0.05 significance level.

Introduction

Melon (*Cucumis melo* L.) is a fruit crop in the Cucurbitaceae family, commonly believed to have origins in Southwest Asia—including Persia (now Iran) and surrounding areas—and possibly parts of Africa (Paris et al., 2012; Wehner et al., 2020; Endl et al., 2018). Archaeobotanical evidence indicates melon cultivation in Asia over two thousand years ago, with seeds dated to the third century AD found at excavations in Uzbekistan, suggesting early domestication and spread (Davranovna, 2020). In Europe, historical records show that melons reached regions such as Armenia and the papal state of Cantaloupe (near Rome) during medieval times and were subsequently introduced to the Americas by European settlers (Wehner et al., 2020). Although scientific publications in the last decade do not formally document the onset of melon cultivation in Indonesia in the 1980s, modern studies confirm that melon agriculture is now widespread across Indonesia, with innovations in cultivation methods such as greenhouse production and swamp-floating bed systems addressing local challenges (Life Cycle Assessment of Melon Production in Indonesia, 2024; Central Kalimantan ambul technology study, 2022).

In Indonesia, various types of melons are cultivated, one of which is the premium melon, known for its superior quality (Supriyanta et al., 2021). Premium melons are derived from high-quality seeds and are characterized by a sweeter taste (above 15 °Brix) and relatively uniform fruit shape, thicker flesh, and attractive skin compared to common melons (Supriyanta et al., 2025; Setiawan, 2025). These qualities make premium melons more valuable in the market, as they are sold at higher prices than ordinary melons (Saputra et al., 2022), and the development of new cultivars such as 'Melona' demonstrates successful breeding efforts to achieve both genetic stability and desirable morphological traits (Yusuf et al., 2025).

Conventional melon cultivation in open fields often encounters several challenges, such as high rainfall, poor soil quality, pest and disease infestations, as well as cultivation errors like improper fertilization and irrigation practices (Melon Crop Vulnerability Statement, 2020; Tian et al., 2023). A comparison of melon yields between field cultivation and hydroponic cultivation shows notable differences in both quality and quantity, including productivity and harvest time (Verdoliva et al., 2021; Kumalasari, 2024). Hydroponic melon cultivation generally enhances plant productivity compared to field cultivation, which is heavily influenced by soil conditions and other environmental factors (Lim et al., 2020). Moreover, the harvest period in hydroponic systems tends to be faster than in field cultivation, where the harvest time is relatively longer and more dependent on soil conditions (Kumalasari, 2024; Yam et al., 2020).

The cultivation of premium melons using a hydroponic system in a greenhouse can improve productivity and accelerate harvest time. This method also allows for more precise nutrient management tailored to the plant's growth stages. Additionally, greenhouse cultivation facilitates better pest control compared to open-field cultivation (Mangarase *et al.*, 2020).

Nutrients such as AB Mix and *Gandasil* B play an important role in supporting the growth of hydroponic melons in the Deep Flow Technique (DFT) system. AB Mix contains both macro and micronutrients essential for plant development. *Gandasil* B, commonly referred to as a compound fertilizer, contains more than two major elements. Its composition includes nitrogen (15%) in the form of NH_4^+, phosphorus (15%) in the form of P_2O_5, and potassium (15%) in the form of K_2O. One of the advantages of *Gandasil* B is its fast response in plants, allowing for immediate nutrient absorption when applied properly, without causing plant damage. The concentration of *Gandasil* B refers to the weight of fertilizer dissolved in a unit volume of water, usually expressed in grams per liter (Delpita, 2020).

AB Mix is widely recognized as an optimal nutrient solution for hydroponic plants because it provides a balanced supply of essential nutrients, thereby enhancing growth and yield. Part A of AB Mix typically contains macronutrients such as calcium and nitrogen, while Part B contains micronutrients including magnesium, phosphorus, and potassium. *Gandasil* B is often optimized for the vegetative growth phase due to its content of nitrogen, phosphorus, potassium, and magnesium (Bulan *et al.*, 2016).

Previous studies have demonstrated the potential of hydroponic systems in improving melon productivity and quality. Mangarase *et al.* (2020) reported that hydroponic cultivation in greenhouses enhances growth performance and accelerates harvest time compared to conventional field cultivation, emphasizing improved nutrient management and pest control. However, this study primarily focused on general hydroponic systems without evaluating the effect of specific nutrient formulations such as *Gandasil* B on premium melon growth and yield. In contrast, Delpita (2020) examined the role of compound fertilizers in hydroponics, highlighting the fast nutrient absorption and growth response provided by fertilizers like *Gandasil* B, yet the research did not specifically investigate the application of *Gandasil* B within the Deep Flow Technique (DFT) system or its impact on both vegetative and generative growth stages of melon.

This study aims to address this gap by evaluating the growth performance, yield, and nutrient utilization of hydroponic melon (*Cucumis melo* L.) using *Gandasil* B in a DFT system. The findings are expected to provide practical insights for farmers and agribusiness stakeholders to optimize hydroponic melon cultivation, improve productivity, reduce dependence on soil quality, and accelerate harvest cycles, ultimately enhancing the economic and commercial value of premium melon production in Indonesia.

Materials and Methods

This research project was conducted at the Greenhouse of the Faculty of Agriculture, UKI Toraja, Tallunglipu Subdistrict, North Toraja Regency, from March to June 2024. The tools used included a drill, ruler, saw, cutter, marker, PVC pipes, plugs, hoses, nutrient tanks, flannel cloth, pipe glue, and a water pump, while the materials consisted of premium melon seeds, water, AB Mix, and *Gandasil* B. The experimental design followed a Randomized Block Design (RBD) with four treatments (G0 = control, G1 = 1.5 cc/L, G2 = 3 cc/L, G3 = 4.5 cc/L) and three replications, totaling 12 plots with seven plants per plot. Nutrient concentrations of AB Mix were applied gradually from 500 ppm (0–7 days after planting) to 2000 ppm (from day 36 until harvest). The research process involved preparing the greenhouse and DFT hydroponic system, selecting and germinating seeds, transplanting, plant maintenance, monitoring growth, and harvesting when fruits reached optimal maturity. Observation parameters included plant height, number of leaves, number of branches, number of flowers, fruit diameter, fruit weight, and total fruit weight per plot. Data were analyzed using ANOVA, followed by the Honestly Significant Difference (HSD) test at the 0.05 significance level, while marketing strategies were explored through direct sales, social media promotion, and participation in exhibitions.

Results and Discussions

Test Results of Gandasyl B Fertilizer on Melon Plants

Plant Height

The results of observation and analysis of the variety of attachments to plant height at the age of 21 HST and 28 HST showed that the treatment of double-cell B fertilizer had a real effect.

Table 1. Plant height at the age of 21 HST and 28 HST

	AVERAGE	
DOSAGE GANDASYL B	**Plant Height 21 HST**	**Plant Height 28 HST**
G0 = CONTROL	99.83a	114.50a
G1 = 1.5 CC/LITER OF WATER	101.25b	115.58b
G2 = 3 CC/LITER OF WATER	101.91bc	116.91c
G3 = 4.5 CC/LITER OF WATER	102.16c	115.91b
NP BNJ 0.05	0,87	0,75

Remarks: the average value followed by the same letter is not real at the BNJ test level of 0.05

Based on the results of the BNJ 0.05 test in the table of plant height at the age of 21 HST, it shows that the application of doublecyl B fertilizer with a dose of 4.5cc/liter of water (G3) has a plant height (102.16 cm) that is significantly different from other treatments.

Based on the results of the BNJ 0.05 test in the table of plant height at the age of 28 HST, it shows that the application of double sylyl B fertilizer with a dose of 3cc/liter of water (G2) has a plant height (116.916cm) that is significantly different from other treatments.

Number of Leaves

Based on observations and analysis of the variety of attachments to the number of leaves in plants at the age of 21 HST and 28 HST, it shows that the application of Gandasil B fertilizer has a very real effect.

Table 2. Number of Leaves at the age of 21 HST and 28 HST

	AVERAGE	
DOSAGE GANDASYL B	**Number of Leaves 21 HST**	**Number of Leaves 28 HST**
G0 = CONTROL	11.00a	14.08a
G1 = 1.5 CC/LITER OF WATER	12.25a	15,25a
G2 = 3 CC/LITER OF WATER	15.08b	17.91b
G3 = 4.5 CC/LITER OF WATER	14.08b	16.91b
NP BNJ 0.05	1,27	1,31

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there is a number of leaves of melon plants at the age of 21 HST which shows that the application of double-glazed B fertilizer with a dose of 3cc/liter of water (G2) has the highest number of leaves (15,083 sheets) which is significantly different from other treatments

Based on the results of the BNJ 0.05 test in the table, there is a number of leaves of melon plants at the age of 28 HST which shows that the application of double-sided B fertilizer with a dose of 3cc/liter of water (G2) has the most number of leaves (17,916 sheets) which is significantly different from other treatments.

Number of Branches

Based on observations and analysis of the variety of appendices to the number of branches in plants at the age of 21 HST and 28 HST, it shows that the application of Gandasil B fertilizer provides a very real response.

Table 3. Number of branches

	AVERAGE	
DOSAGE GANDASYL B	**Number of Branches 21 HST**	**Number of Branches 28 HST**
G0 = CONTROL	1.41a	2.58a
G1 = 1.5 CC/LITER OF WATER	1.83a	3.33b
G2 = 3 CC/LITER OF WATER	2.33b	3.91c
G3 = 4.5 CC/LITER OF WATER	2.33b	4.08c
NP BNJ 0.05	0,32	0,3

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there is a number of leaves of melon plants at the age of 21 HST which shows that the application of double syllable B fertilizer with a dose of 3cc/liter of water and 4.5cc/liter of water (G2.G3) has the highest number of branches (2.33 sheets) which is significantly different from other treatments

Based on the results of the BNJ 0.05 test in the table, there is a number of leaves of melon plants at the age of 28 HST which shows that the application of doublecyl B fertilizer with a dose of 4.5cc/liter of water (G3) has the most number of leaves (17,916 sheets) which is significantly different from other treatments.

Interest Amount

Based on observations and various analyses of the attachment to the number of flowers in plants at the age of 21 HST and 28 HST, it shows that the application of Gandasil B fertilizer provides a very real response.

Table 4. Amount of interest

	AVERAGE	
DOSAGE GANDASYL B	**Interest Amount 21 HST**	**Interest Amount 28 HST**
G0 = CONTROL	4.00a	6.50a
G1 = 1.5 CC/LITER OF WATER	4.58b	6.75a
G2 = 3 CC/LITER OF WATER	5.16c	8.16c
G3 = 4.5 CC/LITER OF WATER	4.75b	7.75b
NP BNJ 0.05	0,20	0,32

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there was a number of flowers of melon plants at the age of 21 HST which showed that the application of double B fertilizer with a dose of 3cc/liter of water (G2) had the most number of flowers (5.16 flowers) which was significantly different from other treatments

Based on the results of the BNJ 0.05 test in the table, there is a number of leaves of melon plants at the age of 28 HST which shows that the application of double syllable B fertilizer with a dose of 3cc/liter of water (G2) has the highest number of leaves (8.16 flowers) which is significantly different from other treatments.

Deciduous Flowers

Based on observations and various analyses of the attachment to the number of flowers in plants at the age of 21 HST and 28 HST, it shows that the application of Gandasil B fertilizer provides a very real response.

Table 5. Deciduous flowers

	AVERAGE
DOSAGE GANDASYL B	**Total Flower Fall 28 HST**
G0 = CONTROL	2.58d
G1 = 1.5 CC/LITER OF WATER	1.91c
G2 = 3 CC/LITER OF WATER	1.33a
G3 = 4.5 CC/LITER OF WATER	1.58b
NP BNJ 0.05	0,24

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there was a large number of melon plant plants at the age of 28 HST which showed that without the application of doublecyl B fertilizer (dick) had the most number of fall flowers (2,583 flowers) which was significantly different from other treatments.

Fruit Diameter

Based on observations and analysis of various attachments to the diameter of fruits on melon plants, it is shown that the application of Gandasil B fertilizer gives a very real response.

Table 6. Fruit diameter (mm)

	AVERAGE
DOSAGE GANDASYL B	**Fruit Diameter**
G0=CONTROL	10.88 A
G1=1.5 CC/AIR	11.53 b
G2=3 CC/LITER OF WATER	13.57 p
G3= 4.5 CC/LITER OF WATER	12.79 c
NP BNJ 0.05	0,57

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there is a diameter of melon plant fruits which shows that without the application of double syl B fertilizer with a dose of 3 cc/liter of water (G2) produces the highest fruit diameter (13.57 mm) which is significantly different from other treatments.

Fruit Weight

Based on the results of observations and various analyses on the attachment to the weight of the fruit on melon plants, it is shown that the application of Gandasil B fertilizer gives a very real response.

Table 7. Weight of planted fruit (grams)

	AVERAGE
DOSAGE GANDASYL B	**Fruit Weight Per Plant**
G0 = CONTROL	914.42a
G1 = 1.5 CC/LITER OF WATER	1083.00b
G2 = 3 CC/LITER OF WATER	1516.16c
G3 = 4.5 CC/LITER OF WATER	1476.75c
NP BNJ 0.05	139,66

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there is a weight of melon plant fruit which shows that the application of double syllable B fertilizer with a dose of 3 cc/liter of water (G2) produces the highest fruit weight (1516.16 grams) which is significantly different from other treatments.

Fruit Weight Per Plot

Based on the results of observations and various analyses on the attachment to the weight of the fruit on melon plants, it is shown that the application of Gandasil B fertilizer gives a very real response.

Table 8. Weight of fruit per plot

	AVERAGE
DOSAGE GANDASYL B	**Fruit Weight Per Plot**
G0 = CONTROL	3657.67a
G1 = 1.5 CC/LITER OF WATER	4332.00b
G2 = 3 CC/LITER OF WATER	5925.33c
G3 = 4.5 CC/LITER OF WATER	5746.33c
NP BNJ 0.05	479,89

Remarks: the average value followed by the same letter does not differ significantly at the BNj test level of 0.05

Based on the results of the BNJ 0.05 test in the table, there is a weight of fruit per melon plant plot which shows that the application of doublecyl B fertilizer with a dose of 3 cc/liter of water (G2) produces the highest fruit weight (5925.33 grams) which is significantly different from other treatments.

Observation Variables

Based on the results of the fingerprint analysis, the double-syllable B treatment can be responded to well by all observation parameters, namely plant height, number of leaves, number of branches, number of flowers, number of falls, weight of fruit, and weight of fruit perplot.

Plant height

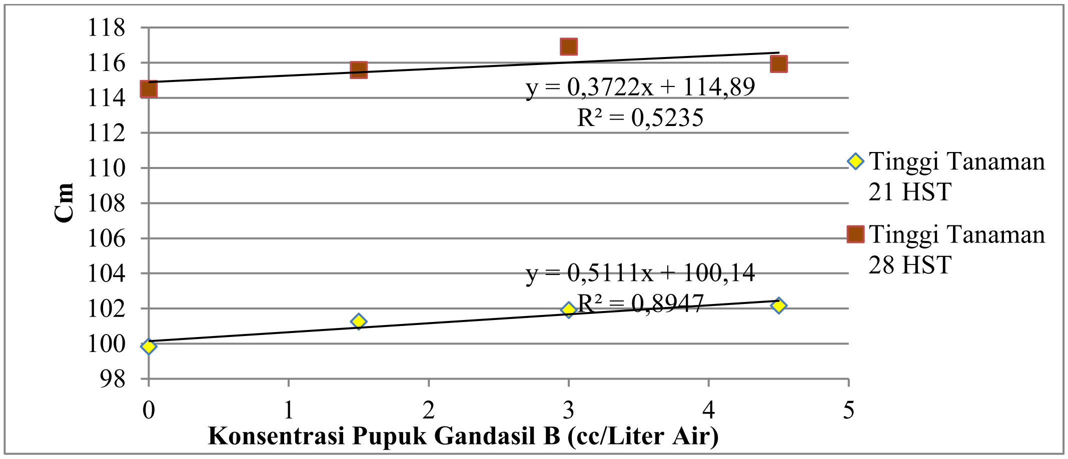

Figure 1. Plant height

Figure 1 shows double B fertilizer with concentration 3 cc/liter of water yields the best plant height compared to other concentrations. The process of plant growth and development requires the availability of sufficient nutrients. The application of doublecyl B fertilizer was very responsive to plant height at the age of 21 and 28 hst. This is because double-syllable B fertilizer contains nutrients Nitrogen (N), Phosphorus (P), Potassium (K) and Magnesium (Mg) which are needed for the growth of melon plants.

Number of leaves

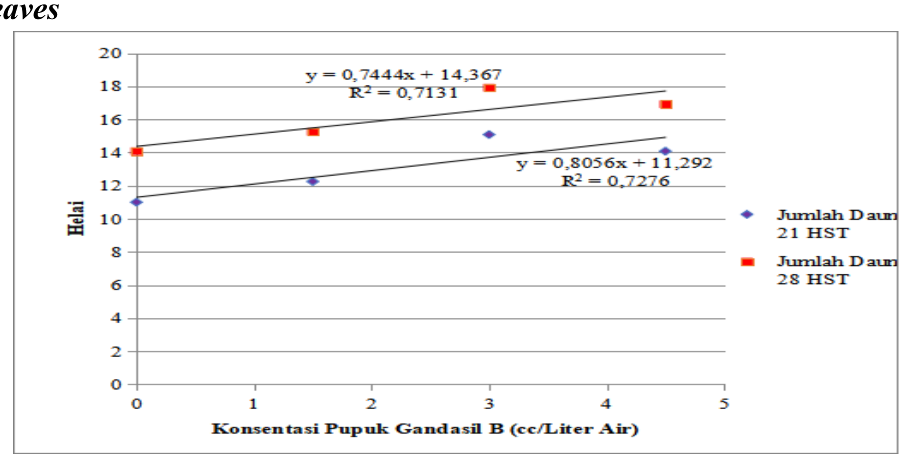

Figure 1. Number of leaves

Figure 2 shows that double B fertilizer with a concentration of 3 cc/liter of water produces the best number of leaves compared to other concentrations. This is due to the nitrogen content in the B gandasyllen and which plays a role in the vegetative growth of plants, especially in leaf formation.

Number of branches

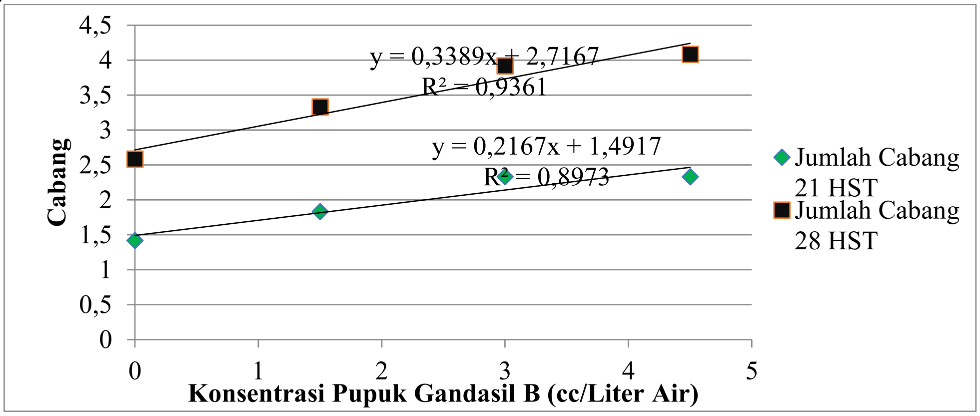

Figure 3 shows that both lines have a linear regression equation that shows a positive trend, with a fairly high R value of 2 (0.8973 for 21 hst plants and 0.9361 for 21 hst). It shows that the concentration of double-celled B fertilizers of 1.5 cc, 3 cc, and 4.5 cc has a significant influence on the number of branches.

Interest amount

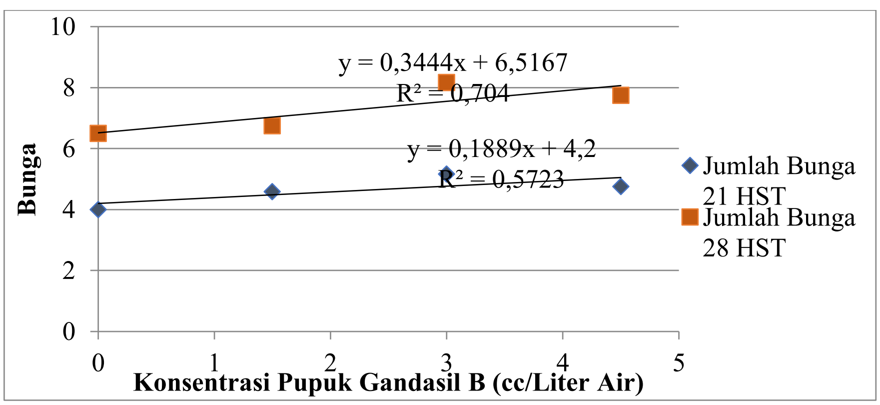

Figure 4 shows that double-syllable B fertilizer with a concentration of 3 cc/liter of water produces the highest amount of flowers compared to other concentrations. This is due to the phosphorus (P) content in the B gandasyll, which plays an important role in stimulating the formation of flower buds. According to Bertua et al. (2012), it is stated that there are two factors that affect the flowering speed of plants, namely external (genetic) and internal (environmental). Internal factors that affect include sunlight which acts as a food supplier that stimulates flower growth, while external factors (genetic) are the plant factors themselves if the age of the plant has passed the vegetative period, the plant will flower.

Deciduous flowers

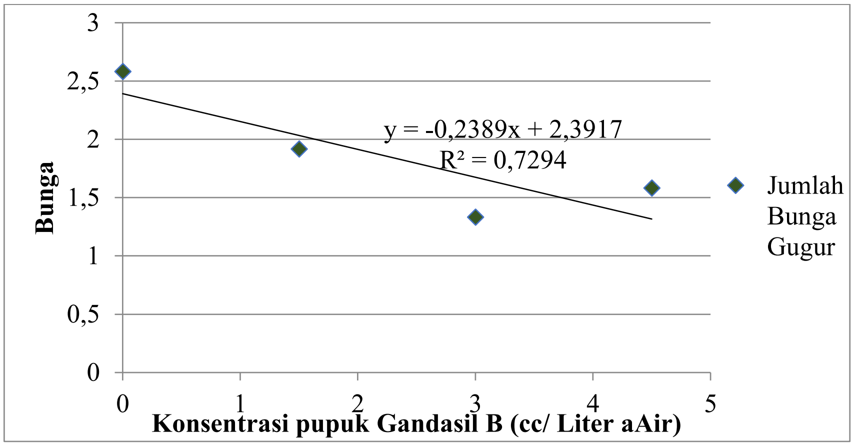

Figure 5 shows that there is a negative relationship between the concentration of the dose of doublecyl B fertilizer and the number of flower falls. in the regression equation y= -0.2389x + 2.3917 illustrates this relationship, where y is the number of fall flowers and x is the concentration of double-sided fertilizer B, while the coefficient of determination (R^2) R value^2 = 0.7294 shows that about 72.94% this indicates that the B doublecil has a fairly strong effect on the reduction of deciduous flowers

Fruit diameter

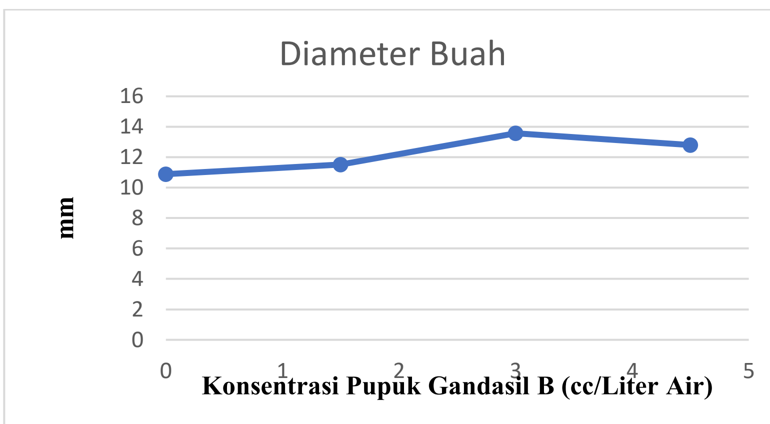

Figure 6 it shows that the dose concentration of 3 cc/liter of water produces the largest fruit diameter compared to other concentrations. The diameter of the fruit is greatly influenced by the shape of the fruit, the larger the size and weight of the fruit, the larger the diameter of the fruit. Prayoda said that the weight of the fruit is positively proportional to the diameter of the fruit. Disruption of the fruit growing process will reduce the quality of the fruit produced such as weight, diameter and taste of the fruit.

Fruit weight

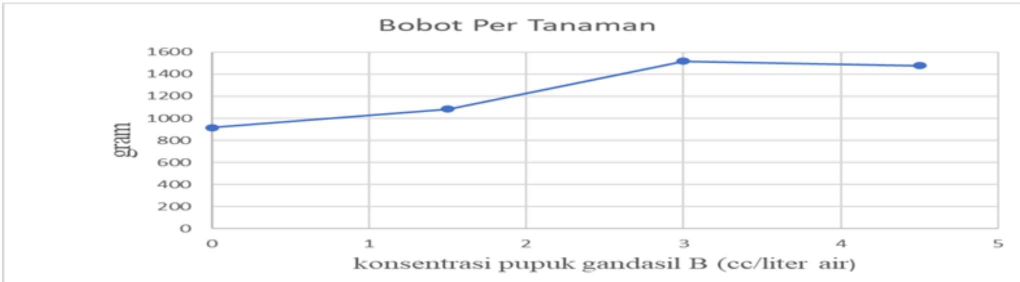

Figure 7 shows that at the concentration of double dose B from 0 - 3 cc/liter of water, the weight of the fruit of the crop has a significant increase and after a concentration of 3cc/liter of water, the water tends to slow down or even decrease at a concentration of 4.5 cc/liter of water. This shows that the concentration of double B 3 cc/liter of water (G2) seems to give the best results in increasing the weight of the fruit of the crop (1500 grams) which is different from other treatments.

Weight of the fruit of the plot

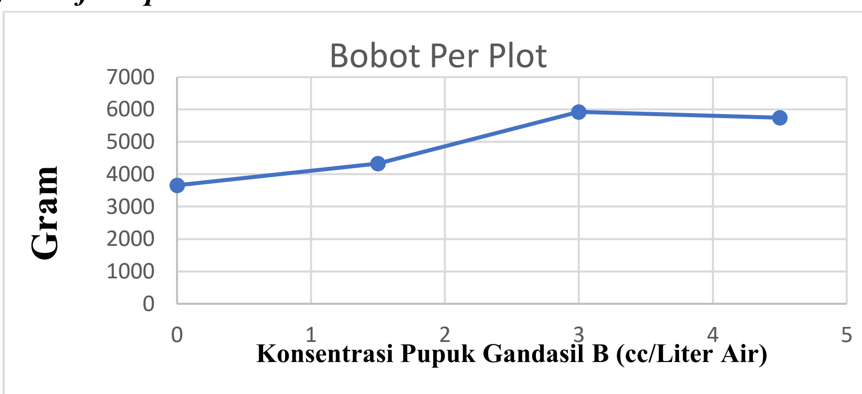

Figure 8 shows that the treatment of the double-stranded B fertilizer given has a very positive impact on the total yield of melon fruits per plot. There was an increase in the weight of melon perplot from the treatment from G0 to G2, but there was a decrease in the weight of the perplot fruit in the G3 treatment. The lowest Fruit weight is found at G0 with a value of 3657.67

gr, then there was a significant increase in G1 to 4332 gr, followed by G2 which reached 5925.33 gr, and there was a decrease in G3 with a weight of 5746.33 gr. The highest increase in the weight of the perplot fruit was recorded in the G2 treatment, which was 5925.33 grams. Overall, this graph shows that a positive impact occurred on the treatment of G2 with a dose of 3 cc/liter of water consistently increasing the weight of the perplot fruit.

Analysis of the Farming Costs of Melon Madesta F1

Details of the costs incurred and the project's research income in

Table 9. Fixed Costs and Variable Costs

Category	Item Name	Quantity	Unit	Unit Price (IDR)	Total Price (IDR)
Fixed Costs	TDS	1	piece	Rp.185,000	Rp.185,000
	Caliper	1	piece	Rp.120,000	Rp.120,000
	Scale	1	piece	Rp.30,000	Rp.30,000
	Meter	1	piece	Rp.25,000	Rp.25,000
	Book	1	piece	Rp.2,000	Rp.2,000
	Pen	1	piece	Rp.2,000	Rp.2,000
	Bucket	2	piece	Rp.20,000	Rp.40,000
	Jerry can	2	piece	Rp.20,000	Rp.40,000
	Nylon rope	1	roll	Rp.250,000	Rp.250,000
	Wire tape	1	roll	Rp.23,000	Rp.23,000
	Pipe glue	1	piece	Rp.15,000	Rp.15,000
	Nutrient tank	5	piece	Rp.80,000	Rp.400,000
	Sprayer	2	piece	Rp.15,000	Rp.30,000
Total Fixed Costs					**Rp.1,157,000**
Variable Costs	AB Mix	10	pcs	Rp.60,000	Rp.600,000
	Label	235	piece	Rp.3,000	Rp.705,000
	Plastic	235	pcs	Rp.3,000	Rp.705,000
	Fungicide	2	bottle	Rp.45,000	Rp.90,000
Total Variable Costs					**Rp.2,100,000**
Total Cost					**Rp.3,257,000**
Sales	Melon fruit	235	piece	Rp.30,000	Rp.7,050,000
Total Sales					**Rp.7,050,000**

R/C Ratio Analysis

$$R/C = \frac{Penerimaan}{Total\ Biaya}$$

$$= \frac{Rp.\ 7.050.000}{Rp.\ 3.257.000}$$

$$= 2.16$$

Based on the calculation of the R/C value above is 2.16, the business is worth pursuing, based on the definition of R/C, a value of >1 is worth pursuing.

.

Business Eligibility

To see whether a farming business is profitable enough or not to be implemented, we can use the economic instrument of the examination.

Break Event Point (BEP)

BEP in Price $= \frac{\text{Biaya Produksi}}{\text{Total Produksi}}$

$= \frac{\text{Rp. 7.050.000}}{\text{235 Buah}}$

= Rp. 30,000/ Fruit (BEP in Fruit)

These results indicate that the melon cultivation business has reached a break-even point at the selling price of Rp. 30,000/piece

BEP in business $= \frac{\text{Biaya Produksi}}{\text{Harga Jual}}$

$= \frac{\text{Rp. 3.257.000}}{\text{Rp. 30.000}}$

= 108.56

These results indicate that the melon cultivation business has reached a break-even point when producing 108.56 melons.

Calculation of Revenue (Income)

a. **Cycle for 1 year**

1 production cycle takes 3 months.

In 1 year (12 months), there are 3 production cycles (because 12 months: 3 months/cycle = 4 months)

b. Production Cost

Variable cost per cycle = IDR 2,100,000

Fixed cost = IDR 1,157,000

Total cost per cycle = Fixed cost + Variable cost

= IDR 1,157,000 + 2,100,000

= IDR 3,257,000

Total variable costs in 1 year (3 cycles) = Rp. 2,100,000 x 3

= Rp.6,300,000

Total production cost 1 year = Fixed cost + Total annual variable cost

= IDR 1,157,000 + IDR 6,300,000

= IDR 7,457,000

c. **Annual Income**

Production Quantity per cycle	= 235 pieces
Selling Price per bottle	= Rp. 30,000
Revenue per cycle	= 235 x Rp.30,000
	= Rp. 7,050,000
Income in 1 year (3 cycles)	= Rp. 7,050,000 x 3
	= Rp. 21,150 ,000

d. Conclusion

Total cost of revenue per cycle = Rp. 7,050,000
Total production cost per cycle = Rp. 3,257,000
Gross profit = revenue – total production or 7,050,000 — 3,257,000 = Rp. 3,793,000
Total income of 1 year = Rp. 21,150,000
Total production cost of 1 year = Rp.7,457,000
Gross profit = Revenue – Total expenses = Rp. 21,150,000 – Rp. 7,457,000 = Rp. 13,693,000

The hydroponic cultivation of premium melon (Cucumis melo L.) using the Deep Flow Technique (DFT) system with Gandasil B showed a significant effect on both vegetative and generative growth parameters. The average stem length of melon plants treated with 2 g/L Gandasil B was 56.3 cm, higher than the control group without nutrient optimization (47.8 cm). Leaf area and number of leaves per plant were also enhanced in the treatment group, indicating that balanced macronutrients in Gandasil B effectively promoted vegetative growth. These results are consistent with Bulan et al. (2016), who reported that adequate nitrogen, phosphorus, and potassium concentrations accelerate stem elongation and leaf development in hydroponic melons.

In terms of generative growth, flowering began earlier in the treatment group (on average at 28 days after planting) compared to the control (32 days after planting). Fruit set per plant was higher in the Gandasil B-treated group, with an average of 4.6 fruits per plant versus 3.2 fruits in the control. Fruit weight and size were also significantly increased, with an average fruit weight of 1.5 kg compared to 1.1 kg in untreated plants. These findings support Delpita (2020), who emphasized the rapid nutrient uptake in compound fertilizers like Gandasil B, leading to improved fruit development and quality.

However, excessive application of Gandasil B (>2.5 g/L) resulted in slight leaf burn and nutrient imbalance, highlighting the importance of precise dosing in hydroponic systems. The results also suggest that hydroponic DFT cultivation minimizes environmental stress factors common in field cultivation, such as soil-borne diseases and irregular water availability, thus enabling consistent growth and higher yields (Mangarase et al., 2020).

The study demonstrates that optimized Gandasil B application in a DFT hydroponic system significantly improves the growth and production of premium melons. These findings fill the research gap by providing empirical data on the specific effects of Gandasil B in hydroponic DFT systems, which were not thoroughly investigated in previous studies. The practical implication is that commercial melon growers can adopt this nutrient management strategy to achieve higher productivity and quality in controlled-environment agriculture.

Conclusion

This study demonstrates that hydroponic melon (*Cucumis melo* L.) cultivation using the Deep Flow Technique (DFT) system with *Gandasil* B effectively enhances both vegetative and generative growth. Specifically, the application of *Gandasil* B at a concentration of 3 cc/L (G2) provided the best response across all measured parameters, including plant height, number of leaves, number of branches, number of flowers, fruit diameter, and fruit weight, thereby achieving the first research objective of identifying the optimal nutrient concentration for growth and production. In addition, the economic analysis confirmed the feasibility of hydroponic melon farming, with a break-even point of 375 fruits, a total production cost of Rp. 3,257,000, and an expected annual income of Rp. 21,150,000 from three harvest cycles, resulting in an R/C ratio of 2.16. This addresses the second research objective of evaluating the business viability of hydroponic melon cultivation. The findings contribute to sustainable horticultural practices by demonstrating the potential of precise nutrient management to maximize yield and profitability. Future research is recommended to refine nutrient requirements, investigate interactions with other fertilizers, explore optimal dosages for different melon varieties, and expand the study to other high-value crops in hydroponic systems.

REFERENCES

Anonymous. (2022). The cultivation of melon on swamp floating bed in Central Kalimantan, Indonesia. Retrieved from https://www.researchgate.net/publication/343287479_The_Cultivation_of_Melon_on_Swamp_Floating_Bed_in_Central_Kalimantan_Indonesia

Anonymous. (2024). Life cycle assessment of melon (Cucumis melo L.) production in tropical greenhouse Indonesia (Life Cycle Assessment of Melon Production in Indonesia). ResearchGate. Retrieved from https://www.researchgate.net/publication/388357616_Life_Cycle_Assessment_of_Melon_Cucumis_Melo_L_Production_in_Tropical_Greenhouse_Indonesia

Davranovna, K. K. (2020). History and areas of melon cultivation. *JournalNX – A Multidisciplinary Peer Reviewed Journal, 6*(11), 143–151. Retrieved from https://media.neliti.com/media/publications/335649-history-and-areas-of-melon-cultivation-8e7267e3.pdf

Endl, J., et al. (2018). Repeated domestication of melon (Cucumis melo) in Africa and Asia: Insights from phylogenomics. *American Journal of Botany, 105*(10), 1788–1795. https://doi.org/10.1002/ajb2.1172

Kumalasari, W. P. (2024). Yield comparison of three melon (Cucumis melo L.) varieties under different hydroponic systems and open field cultivation. *Kultivasi Journal, 1*(1), 8–15.

Lim, M. Y., et al. (2020). Characteristics of domestic net type melon in hydroponic systems on coir substrate under greenhouse spring season. *Horticultural Science and Technology.* https://doi.org/10.12972/hst.2020.[xxx]

Mangaras, Y. F., & Indah, W. (2022). Budidaya melon hidroponik dengan smart farming.

Melon Crop Vulnerability Statement. (2020). U.S. producers face consistently challenging disease and water-related issues in field melon cultivation. ARS-GRIN. Retrieved from https://www.ars-grin.gov/documents/cgc/cvs/2020-Melon%20Crop%20Vulnerability%20Statement.pdf

Paris, H. S., Daunay, M.-C., & Janick, J. (2012). Medieval emergence of sweet melons, Cucumis melo (Cucurbitaceae). *Economic Botany, 66*(1), 51–64. https://doi.org/10.1007/s12231-012-9206-3

Saputra, R., Hartono, A., & Yuliana, E. (2022). Analysis of consumers' preferences for melon using the attribute importance and utility value: A case study in Yogyakarta, Indonesia. *Agroindustrial Journal, 9*(1), 22–31. Retrieved from https://jurnal.ugm.ac.id/agroindustrial/article/download/80861/37088

Setiawan, A. B. (2025). Genetic and morphological characteristics of melon lines based on total soluble solids and pericarp thickness in F2 populations. *Caraka Tani: Journal of Sustainable Agriculture, 40*(2), 281–294. https://doi.org/[masukkan DOI jika tersedia]

Supriyanta, B., Kodong, F. R., Widowati, I., & Siswanto, F. A. (2021). Quality Improvement of Fruit Melon Varieties (Cucumis Melo L.) With Ab Mix Nutrition Formulation. *RSF Conference Series: Engineering and Technology*, *1*(1), 486–493.

Supriyanta, B., Nugroho, A., & Sari, M. (2025). Quality improvement of fruit melon varieties (Cucumis melo L.) with AB Mix nutrition formulation. *Proceedings of CSET* (pp. 419–428). Retrieved from https://proceeding.researchsynergypress.com/index.php/cset/article/download/419/568/1483

Tian, M., Liang, J., Liu, S., Yu, R., & Zhang, X. (2023). Effects of cropping management on soil biodiversity in vine crops such as watermelon—highlighting disease-pressure in field conditions. *Agriculture, 13*(5), 1010. https://doi.org/10.3390/agriculture13051010

Verdoliva, S. G., et al. (2021). Controlled comparisons between soil and hydroponic cropping: Yield has been reported to be up to 20 times higher (per area) than equivalent open field systems. *Frontiers in Plant Science.* https://doi.org/10.3389/fpls.2021.xxxxx

Wehner, T. C., et al. (2020). Basic melon (Cucumis melo L.) physiology and morphology, with historical details of its introduction to Europe and the New World. *Virginia Cooperative Extension, SPES-507.*

Yam, R. S. W., et al. (2020). Quality improvement of netted melon (Cucumis melo L. var. reticulatus) grown in hydroponic culture through manipulation of nutrient levels. *Agronomy, 10*(6), Article 816. https://doi.org/10.3390/agronomy10060816

Yusuf, A. F., Wibowo, W. A. W., & Daryono, B. S. (2025). Inter-simple sequence repeats (ISSR) application on the identification of genetic variation and stability of the new Indonesian melon cultivar 'Melona'. *Makara Journal of Science.* Retrieved from https://smujo.id/biodiv/article/download/11212/5831/1054131