The Effect of Red-Blue Led Intensity on the Growth and Yield of Lettuce Varieties Cultivated Using NFT Hydroponics

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ABSTRACT

Optimizing the growth of lettuce (*Lactuca sativa*) under controlled lighting conditions is essential for improving indoor farming systems. Therefore, this study aims to examine the effect of the intensity of 3030 LED (light emitting diode) type 7520 red-blue Grow Light on the growth of 3 Lettuce varieties, which were cultivated using NFT hydroponics. The study procedures were carried out using Completely Randomized Design (CRD) with 2 factors. These factors included 1) intensity of the red-blue SMD 3030 LED Grow Light type 7520 with levels of 0%, 30%, 70%, and 100%, and 2) lettuce varieties, namely Batavia Caipira, Red Rapid, and New Grand Rapid. Data obtained were analyzed for variance at the 5% level and the Honest Significant Difference Test at the 5% level. The results showed that giving a red-blue SMD 3030 type 7520 LED Grow Light with an intensity of 100% to Batavia Caupa lettuce variety produced the highest number of leaves at 35, 42, and 45 days after sowing (DAS). Moreover, an intensity of 70% led to greater plant height, which was observed to be better at 45 days after sowing. LED lights with 100% intensity promoted superior growth in leaf area, fresh stover weight, and fresh root weight compared to other intensities. New Grand Rapid variety exhibited a plant height of 47 cm, a leaf area of 109.1 cm², a fresh stem weight of 144.2 g, and a dry root weight of 1.8 g, outperforming the other varieties. Meanwhile, Batavia Caipira variety produced a greater number of leaves (29.3 leaves) compared to others.

Keywords: Hydroponics; lactuca sativa; light emitting diode

INTRODUCTION

In recent years, there has been an increase in the demand for lettuce due to its use in various hotels, restaurants, and street food. This increased demand is primarily caused by the awareness of its nutritional content, ease of processing (can be eaten raw), and high aesthetic value (Hadianto et al., 2020). In Indonesia, the commonly grown varieties of lettuce include Batavia Caipira, New Grand Rapid, and Red Rapid. Batavia lettuce has large, crisp, and delicious leaves (Zwaan, 2019) along with a high nutritional value, such as vitamin C, vitamin A, fiber, and essential minerals. New Grand Rapid variety is selected due to its heat-cold resistance and fine leaves that are preferred by consumers (Syafri et al., 2010). Meanwhile, red lettuce is popular for its delicious taste, good nutritional content, high demand in the food industry, and economic value as an export commodity. It is also suitable for hydroponic cultivation and has good commercial prospects (Saroh&

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Sari Harahap, 2016). Although lettuce is becoming increasingly popular, there are still challenges in its cultivation. Proper cultivation methods, particularly in terms of lighting, are essential to achieve optimal harvests to produce varieties, such as Batavia Caipira, New Grand Rapid, and Red Rapid successfully (Miao et al., 2023). This indicates the urgent need to conduct in-depth studies on the influence of lighting on lettuce varieties to improve production and quality.

Lettuce requires sunlight for photosynthesis, as carbon dioxide and water are converted into oxygen and sugar with the help of light. For high protein and carbohydrate content, 14 to 16 hours of sunlight exposure per day is necessary. However, sunlight is limited to less than 12 hours per day in Indonesia (Afidah et al., 2019; Hamdi, 2014; Zulkarnain, 2010). Heat radiation above 40°C increases transpiration, causing lettuce to wilt (Silaen, 2021), while the rainy season reduces light, which affects growth (Anggrenia, 2018). According to Cartika et al. (2022), artificial lighting, such as LED Grow Light (light emitting diode) can be used as an alternative.

The use of LED Grow Light can improve plant growth by supplementing natural sunlight (Rizaludin, 2020; Salma Alghaniya et al., 2021) and allowing photosynthesis to occur at night or during low light intensity (Gusti Dini Alhadi et al., 2016). In addition, LED lights are brighter, consume less power, generate minimal heat, and are adjustable (Fajri A et al., 2014; Faridha & Saputra, 2016). Several studies have shown their ability to accelerate the growth of plants, such as Chinese kale, red lettuce, and bok choi (Adi Nugraha et al., 2020; Anindyarasmi et al., 2021; Himami, 2021). Hydroponic cultivation methods are also effective and well-suited for urban farming (Sultan Salahuddin & Kowanda, 2018). Recent studies have demonstrated the significant impact of LED light intensity on plant growth. For instance, Alrajhi et al. (2023) observed that varying LED spectra affected the growth, yield, and nutritional value of red and green lettuce. This emphasizes the necessity of optimizing light conditions to enhance crop productivity in controlled environment agriculture (CEA) systems.

Hydroponics is a method of growing plants without soil using only water and nutrients. This method is relatively easy to clean, avoids soil problems, saves fertilizer and water, requires less space, produces good plants, and is simple to manage. Iswanto et al. (2020) reported that the Nutrient Film Technique (NFT) helps plants grow faster because the nutrient water keeps flowing, providing water, nutrients, and oxygen constantly Therefore, this study aims to examine the effect of providing LED 3030 type 7520 red-blue Grow Light with various intensities on the growth and yield of several lettuce varieties cultivated using NFT hydroponics system.

METHODS

Materials

The materials used included rockwool, lettuce seeds of Batavia Caipira variety, Red Rapid variety, New Grand Rapid variety, AB mix fertilizer brand ‘General Sayur’ from Indonesia, pH reducing HNO3, and water. AB Mix ‘General Sayur’ referred to a type of fast-release hydroponic fertilizer that dissolved completely and contained a total of 17 essential and beneficial nutrients highly needed by plants. These nutrients included Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), Sulfur (S), Iron (Fe), Boron (B), Manganese (Mn), Zinc (Zn), Copper (Cu), Molybdenum (Mo), Chlorine (Cl), Nickel (Ni), Sodium (Na), Cobalt (Co), and Iodine (I).

Several types of equipment were used such as NFT hydroponic module of size 8 x 2 m (water gutter, 2 cm styrofoam sheet, 200-liter nutrient solution tank, light steel channel C 75.65 structure, ridge, UV plastic 14% 200 microns, ½ inch pipes, Hikari 28 watt aquarium pump), LED 3030 type 7520 12V 3W red and blue (ratio of 2:2 for each plant), and light steel holo 4 x 2. Others included aluminum foil, lux meter, 12V 40A power supply, 10k potentiometer, DC light sensor switch, 40A fuse, stranded copper wire, double-sided tape, TDS meter (Total Dissolved Solids), ruler, scale, pH meter, calipers, measuring cup, PE 7 mm hose, writing tools, smartphone camera for documentation needs, seeding tray, and soldering iron.

LED Grow Light Module

Grow Light (GL) module was assembled using hollow lightweight steel measuring 4 x 2 cm, while GL module had dimensions of 120 x 120 cm and could accommodate 36 planting holes. Subsequently, LED grow lights was installed 30 cm above NFT hydroponic pipes. The light was hung with iron wire on GL module. Each planting hole contained 4 LED strips with a composition ratio of 2 blue strips and 2 red strips, as shown in Appendix 3. Furthermore, each LED strip had 3 LED emitters with a power of 3 Watts and 12 V, and a total of 144 strips were installed. The circuit is arranged in parallel, with the power supply coming from a 12V DC 40A power source connected to an AC 220V 50Hz electrical supply. This LED could be automatically turned on by a light sensor switch when there was no sunlight (at night). The photoperiod duration for the lights was set to 16 hours of light per day. This duration was selected to optimize the growth conditions for the plants by mimicking long daylight hours. Each plot contained 4 LED strips with 2 red strips and 2 blue strips, measured at an intensity of 1477 lux at a distance of 30 cm using a lux meter. Intensity calibration was adjusted by controlling the current with a 10K potentiometer. Treatment A was the control with no LED light (0%), B had an intensity of 40% or 590 lux, C had an intensity of 70% or 1033 lux, and D had an intensity of 100% or 1477 lux.

Plant Materials and Growth Conditions

This study was conducted from April to June 2023 in Panarung Subdistrict, Pahandut District, Palangka Raya City, focusing on 3 lettuce varieties, namely V1 = Batavia Caipira, V2 = Red Rapid, and V3 = New Grand Rapid. Each plant was grown using hydroponic methods under controlled conditions.

Treatments

The experiment employed a Completely Randomized Design (CRD) in a factorial arrangement with two treatment factors and three replications. The first treatment factor was LED intensity, where each plant received light from four LEDs consisting of two red and two blue LEDs. This factor had four levels of intensity: L0 = 0% (0 lux), L1 = 40% (590 lux), L2 = 70% (1033 lux), and L3 = 100% (1477 lux). The second treatment factor was lettuce variety, which included three types: V1 = Batavia Caipira, V2 = Red Rapid, and V3 = New Grand Rapid. The combination of these two factors produced 12 unique treatment combinations, each replicated three times, resulting in a total of 36 experimental units.

Observed Variable

The observed variables in this study included plant height, number of leaves, leaf area, fresh shoot weight, and dry shoot weight. The observed variables in this research study included plant height, number of leaves, leaf area, fresh shoot weight, and dry shoot weight. Plant height was measured at 14, 21, 28, 35, and 42 days after sowing (DAS) using a ruler in centimeters (cm), from the base of the stem to the growing point. The number of leaves was determined at the same intervals by counting the fully opened leaves on the sampled plants. Leaf area was measured destructively at 45 DAS using the recommended formula $A = b \times l \times w$, which incorporates the leaf shape coefficient (b), leaf length (l), and leaf width (w). Fresh shoot weight was recorded at 45 DAS by weighing the fresh biomass using a scale. Dry shoot weight was also measured destructively at 45 DAS using the gravimetric method, which involved drying the samples in an oven at 70 °C until their weight remained constant.

Experimental Design

The data were analyzed using statistical methods appropriate for CRD, and results were presented with significance levels determined by appropriate tests as summarized in Table 1.

Statistical Analysis

The observation data were analyzed by analysis of variance (ANOVA) (F test) at a significance level of α = 5%. When there was a significant effect on the treatment, then it could be followed by an Honestly Significant Difference (HSD) test at a significance level of α = 5% to determine the effect between treatment levels.

RESULTS AND DISCUSSION

Plant Height

Analysis of variance indicated that there was no interaction between LED Grow Light intensity treatment and variety type on plant height at 14, 21, 28, 35, 42, and 45 DAS. LED intensity treatment exhibited a significant influence on plant height at the ages of 28, 35, 42, and 45 DAS. Lettuce plant variety had a

Table 1. Table of experimental designs

Treatment factor II - lettuce varieties (V)	Treatment factor I - LED intensity (L)			
	L0: 0% (0 lux)	L1: 40% (590 lux)	L2: 70% (1033 lux)	L3: 100% (1477 lux)
V1: Batavia Caipira	L0V1	L1V1	L2V1	L3V1
V2: Red Rapid	L0V2	L1V2	L2V2	L3V2
V3: New New Grand Rapid	L0V3	L1V3	L2V3	L3V3

Table 2. The average plant height (cm) of lettuce varieties with different LED Grow Light intensities at 14, 21, 28, 35, 42, and 45 days after sowing (DAS)

Treatment	The average plant height (cm) of lettuce varieties at (DAS)					
	14	21	28	35	42	45
Intensity LED Grow Light (L)						
0% (L0)	7.60	10.74	13.72 ab	23.91 b	26.99 b	29.01 b
30% (L1)	7.49	10.71	15.38 ab	26.46 ab	30.67 ab	32.97 ab
70% (L2)	7.42	10.90	15.43 a	32.03 a	34.34 a	36.94 a
100% (L3)	7.61	9.51	13.60 b	26.65 ab	30.12 ab	32.38 ab
HSD at 5%	ns	ns	1.83	5.78	5.07	5.45
Variety of *Lactuca sativa*						
Batavia C. (V1)	7.23 b	8.93 c	12.50 b	19.54 b	22.19 b	23.86 b
Red Rapid (V2)	7.17 b	10.37 b	13.28 b	22.87 b	25.36 b	27.26 b
New Green Rapid (V3)	8.19 a	12.10 a	17.83 a	39.38 a	44.04 a	47.36 a
HSD at 5%	0.58	1.14	1.43	4.54	3.98	4.27

Note: Numbers followed by the same lowercase letter in the same row/column were not significantly different according to the Honestly Significant Difference (HSD) test at the 5% level

significant effect on plant height at the ages of 14, 21, 28, 35, 42, and 45 DAS.

The average lettuce plant height in Table 2 showed that the best effect of 70% intensity was that the results were 36.9 cm, which was different from that of 0% intensity, resulting in a plant height of 29 cm. However, it was not significantly different from the 30% and 100% intensity treatments. The influence of 0% LED intensity resulted in very low plant heights due to the condition of no supplementation (Table 2). Therefore, photosynthesis solely relied on sunlight with a photoperiod of less than 12 hours/day. The lack of sunlight exposure in Indonesia led to a decrease in the duration of the photosynthesis process, resulting in low plant growth (Cartika et al., 2022). Lettuce required a photoperiod of 14 to 16 hours/day for optimal growth (Kondrateva et al., 2021). The addition of LED Grow Light exposure starting from 30% provided sufficient additional light for the photosynthesis photoperiod and growth processes. Plant growth was slightly better compared to the condition of 0% without the addition of LED Grow Light, but it was not optimal. At an intensity of 70% of its maximum, plants received a sufficient photoperiod of light for photosynthesis and maximum growth. In conditions of maximum 100% LED Grow Light intensity, plant height was lower compared to intensities of 30% and 70%. This was due to the inhibition of the auxin hormone, which played a significant role in plant height (Handriawan et al., 2016).

The results of the average height of lettuce plants in Table 2 showed that the highest variety, namely New Grand Rapid, obtained an average of 47.4 cm, significantly different from Batavia Caipira variety, which averaged 23.9 cm, and Red Rapid 27.3 cm.

The harvest results revealed in Figure 1 illustrated the differences in LED Grow Light intensities 0% (L0),

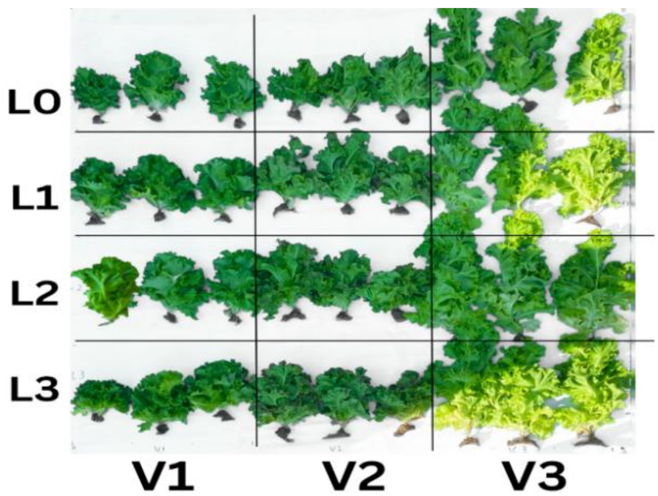

Figure 1. The harvest results at 45 days after sowing (DAS)

Table 3. The average number of leaves of *Lactuca sativa* varieties in LED Grow Light intensity treatment at 14, 21, 28, 35, 42, and 45 days after sowing (DAS)

Treatment	The average number of *Lactuca sativa* leaves at- (DAS)					
	14	21	28	35	42	45
Intensity *LED Grow Light* (L)						
0% (L0)	6.88 b	9.00	14.00 b	18.22 b	22.33 b	24.11 b
30% (L1)	7.00 ab	9.22	14.00 b	19.55 ab	23.78 ab	25.78 ab
70% (L2)	7.00 ab	9.11	14.44 ab	20.00 ab	24.44 ab	26.33 ab
100% (L3)	7.22 a	9.56	15.22 a	21.00 a	26.22 a	28.00 a
HSD at 5%	0.31	ns	1.15	1.94	2.71	2.83
Variety of *Lactuca sativa*						
Batavia C. (V1)	7.92 a	10.17 a	16.25 a	22.08 a	27.25 a	29.25 a
Red Rapid (V2)	7.00 b	9.08 b	14.25 b	17.33 c	21.08 c	22.83 c
New Green Rapid (V3)	6.17 c	8.41 c	12.75 c	19.67 b	24.25 b	26.08 b
HSD at 5%	0.24	0.66	0.89	1.51	2.12	2.21

Note: Numbers followed by the same lowercase letter in the same column and numbers followed by the same uppercase letter in the same row were not significantly different according to the Honestly Significant Difference (HSD) test at the 5% level.

30% (L1), 70% (L2), and 100% (L3), as well as the lettuce variety types Batavia Caipira (V1), Red Rapid (V2), and New Grand Rapid (V3). The color of lettuce plant leaves at the end of harvest became brighter green because as the plants get closer to harvest, the chlorophyll levels decrease. Furthermore, the aging process (senescence) occurred in the leaves, where during this phase, chlorophyll began to break down, and the leaves changed color to yellow. This decrease in chlorophyll was a natural part of the leaf aging process, also known as chlorophyll degradation (Supriani et al., 2021; Boros et al., 2023).

Number of Leaves

Analysis of variance showed an interaction between the treatment of LED Grow Light intensity and lettuce variety types on the number of leaves starting from the age of 35, 42, and 45 DAS.

Table 3 indicated that the application of 100% LED intensity resulted in the average number of leaves being higher than other intensities of LED at 14, 21, 28, 35, 42, and 45 DAS. In Table 4, the combination of 100% LED intensity and Batavia Caipira lettuce variety (L3V1) resulted in the highest number of leaves at 35, 42, and 45 DAS, with 24.25, 30.7, and 32 leaves, respectively. Increased light intensity was the primary source of energy for the photosynthesis process (Proietti et al., 2023). The photosynthates produced were transported through the phloem to all plant tissues, and used to accelerate the growth of shoots, leaves, and stems, allowing the plant to grow optimally. The study before showed that when a plant has more leaves, it grows better because it can get more light. This helps photosynthesis to work more (Feng et al., 2019).

Leaf Area

The analysis of variance showed no interaction between LED GL intensity and lettuce variety types on leaf area at the harvest age of 45 DAS. Furthermore, the intensity of treatment significantly affected the leaf area. LED GL intensity level of 100% (L3) resulted in the largest leaf area, with an average of 108.1 cm^2. In this study, lettuce variety types significantly affected the average leaf area, with New Grand Rapid variety (V3) having the largest average leaf area of 109.1 cm^2. The average leaf area at 45 DAS was presented in Table 5.

The increase in light intensity to an optimal level could enhance the total net assimilation rate of plants, leading to a higher production of photosynthates. This increase in photosynthates stimulated the growth of plant organs, including an expansion in the leaf area. The growth of larger leaves resulted in an increased net assimilation rate, which ultimately led to an increase in both fresh and dry plant weights (Li et al., 2016).

Table 4. The average number of leaves of *Lactuca sativa* varieties impacted by the interaction of LED Grow Light intensity treatment at 35, 42, and 45 days after sowing (DAS)

Age (DAS)	Variety (V)	*LED Grow Light* (L) Intensity			
		0% (L0)	30% (L1)	70% (L2)	100% (L3)
35	*Batavia C.* (V1)	19.50a	21.75ab	22.25ab	24.25a
		A	A	A	A
	Red Rapid (V2)	18.75a	18.50a	16.00a	15.25a
		A	A	A	B
	New G. R. (V3)	16.00c	17.75bc	21.00ab	23.50a
		A	A	A	A
	HSD 5%	4.39			
42	*Batavia C.* (V1)	24.18a	26.97a	27.59a	30.07a
		A	A	A	A
	Red Rapid (V2)	23.25a	22.94a	19.84a	18.91a
		A	A	B	B
	New G. R. (V3)	19.84b	22.01b	26.04a	29.14a
		A	A	A	A
	HSD 5%	6.13			
45	*Batavia C.* (V1)	26.00a	29.00a	29.67a	32.33a
		A	A	A	A
	Red Rapid (V2)	25.00a	24.67a	21.33a	20.33a
		A	A	B	B
	New G. R. (V3)	21.33c	23.67bc	28.00ab	31.33a
		A	A	A	A
	HSD 5%	6.39			

Note: Numbers followed by the same lowercase letter in the same column and numbers followed by the same uppercase letter in the same row were not significantly different according to Honestly Significant Difference (HSD) test at the 5% level.

Shoot Fresh Weight

Analysis of variance indicated that there was no interaction between the influence of LED Grow Light intensity and lettuce variety types on fresh shoot weight at the age of 45 days after sowing. However, the intensity treatment significantly affected the fresh shoot weight at the age of 45 HSS

Table 6 showed that the 100% GL LED intensity level (L3) resulted in the largest fresh shoot weight, with an average of 151 g. The lettuce variety types significantly affected the average fresh shoot weight, with New Grand Rapid variety (V3) having the largest average fresh shoot weight of 144.2 g. Furthermore, the influence of LED Grow Light intensity significantly affected the fresh shoot weight compared to without the addition of LED Grow Light. Optimal light enhanced photosynthesis more rapidly and resulted in greater photosynthesis output. The amount of light captured during photosynthesis indicated

Table 5. The average leaf area per plant (cm^2) of *Lactuca sativa* varieties in LED Grow Light intensity treatment at 45 days after sowing (DAS)

Treatment	The average leaf area per plant (cm^2) of *Lactuca sativa* 45 DAS
Intensitas *LED Grow Light* (L):	
0% (L0)	82.32 b
30% (L1)	101.58 ab
70% (L2)	102.28 a
100% (L3)	108.06 a
HSD 5%	19.96
Varieties of *Lactuca sativa*:	
Batavia C. (V1)	93.30 b
Red Rapid (V2)	93.31 b
New Green Rapid (V3)	109.07 a
HSD 5%	15.65

Note: Numbers followed by the same letter in the same row/column were not significantly different according to Honestly Significant Difference (HSD) test at the 5% level.

Table 6. The average shoot fresh weight (g) of *Lactuca sativa* varieties in LED Grow Light intensity treatment at 45 days after sowing (DAS)

Treatment	The average fresh shoot weight (g) at 45 DAS
Intensitas *LED Grow Light* (L):	
0% (L0)	96.11 b
30% (L1)	132.22 a
70% (L2)	140.55 a
100% (L3)	151.00 a
HSD 5%	25.08
Varieties of *Lactuca sativa*:	
Batavia C. (V1)	135.83 a
Red Rapid (V2)	109.92 b
New Green Rapid (V3)	144.17 a
HSD 5%	19.67

Note: Numbers followed by the same letter in the same row/column are not significantly different according to Honestly Significant Difference (HSD) test at the 5% level.

the biomass of the plant. The larger the photosynthesis output, the greater the biomass formation. Meanwhile, under 0% intensity conditions, the lowest fresh shoot weight was obtained. The lack of light received by the plants inhibited metabolism, thereby reducing plant biomass (Adhi Wibowo et al., 2018).

Table 7. The average shoot dry weight (g) of *Lactuca sativa* varieties in LED Grow Light intensity treatment at 45 days after sowing (DAS)

Treatment	The average root shoot dry weight (g) of *Lactuca sativa at 45 DAS*
Intensity *LED Grow Light* (L):	
0% (L0)	1.36 c
30% (L1)	1.81 ab
70% (L2)	1.56 bc
100% (L3)	1.93 a
HSD 5%	0.31
Varieties of *Lactuca sativa*:	
Batavia C. (V1)	1.51 b
Red Rapid (V2)	1.68 ab
New Green Rapid (V3)	1.81 a
HSD 5%	0.24

Note: Numbers followed by the same letter in the same row/column are not significantly different according to the Honestly Significant Difference (HSD) test at the 5% level.

Shoot Dry Weight

Analysis of variance indicated no interaction between the influence of LED Grow Light intensity and lettuce variety types on dry root shoot weight. However, the treatment of LED Grow Light intensity and lettuce variety types significantly affected the dry root shoot weight. Table 7 showed that the 100% GL LED intensity level (L3) resulted in the highest dry root shoot weight, with an average of 1.9 g. Lettuce variety types significantly affected the dry root shoot weight at 45 DAS. New Grand Rapid variety (V3) obtained the highest dry root shoot weight, with an average of 1.8 g.

The increase in dry root shoot weight with the increasing intensity of LED Grow Light resulted in a greater number of leaves and wider leaf area. This could lead to increased root biomass to accommodate the water and nutrient absorption needed for transportation to all tissues. The use of red and blue LED lights provided optimal lighting conditions to support efficient photosynthesis and proper hormone distribution, which ultimately improved lettuce plant root growth. Red and blue light affected the distribution of auxin, which was a hormone that played a significant role in plant growth. Blue light usually inhibited stem elongation and accelerated leaf growth, while red light stimulated stem and root elongation. Auxin played an important role in directing root growth by stimulating lateral root formation and main root elongation. The mix of red and blue light helped plants get the right energy balance, which made photosynthesis better and helped send more resources to the roots This indicates that the plant not only exhibited enhanced shoot growth but also developed a stronger and more extensive root system to support overall growth. (Boros et al., 2023).

CONCLUSION

In conclusion, this study showed how the LED 3030 type 7520 red-blue Grow Light affected the growth of different lettuce types like Batavia Caipira, Red Rapid, and New Grand Rapid, which were grown with NFT hydroponics. The results showed that there was an interaction effect between 100% LED Grow Light intensity and Batavia Caipira variety on the parameter of leaf number. Meanwhile, the use of New Grand Rapid variety combined with 100% LED intensity displayed the best results for the parameters of plant height, leaf area, number of leaves, fresh shoot weight, and dry root weight. Future studies must explore the effects of light intensities higher than 1477 lux, considering potential limitations or optimal intensity ranges to enhance the discussion. Increased light intensity could boost photosynthesis and growth up to a certain point, beyond which photoinhibition occurred. Therefore, understanding these thresholds could help optimize LED applications for better agricultural outcomes.

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CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the publication of this study.

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