CANNABOOST 加農夫配方與僅使用農夫配方對草莓產量及品質影響的試驗報告

Study Report on the Impact of CANNABOOST + Farmer's Formula vs. Farmer's Formula Alone on Strawberry Yield and Quality

CANNA X 香港綠屋有限公司研究項目

Research Project: CANNA X Greenhouse Co. Ltd. (HK)

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合作單位：CANNA 與香港綠屋有限公司

一、項目背景與意義 / Background and Significance

草莓作為高經濟價值的作物，廣泛種植於全球各地。傳統的種植方法（即農夫配方）在一定程度上能夠滿足草莓的生長需求，但隨著現代農業技術的發展，如何通過科學的營養管理進一步提高草莓的產量和品質，成為了種植者關注的焦點。

Strawberries, as a crop with high economic value, are widely grown around the world. While traditional farming methods (i.e., farmer's formula) can meet the basic growth needs of strawberries, with the development of modern agricultural technologies, growers are increasingly focused on how to further improve yield and quality through scientific nutrient management.

CANNABOOST 是一種高效的植物生長促進劑，能夠通過改善植物的代謝水平和光合作用，提高作物的開花量、果實大小、糖度和整體品質。本項目旨在研究在傳統農夫配方的基礎上，添加 CANNABOOST 是否能顯著提升草莓的產量和品質，並與僅使用農夫配方的種植方式作對比。

CANNABOOST is an effective plant growth booster that enhances plant metabolism and photosynthesis, thereby increasing the number of flowers, fruit size, sweetness, and overall quality. This project aims to study whether adding CANNABOOST to the traditional farmer's formula can significantly improve the yield and quality of strawberries compared to using the farmer's formula alone.

1.1 項目概述 / Project Overview

本試驗於香港綠屋有限公司溫室進行，草莓定植時間為 2024 年 10 月 12–14 日，實驗組與對照組皆於 10 月 13 日完成下苗。
The trial was conducted in the greenhouse of Green House Co., Ltd. in Hong Kong. Strawberries were planted between October 12–14, 2024, with both control and experimental groups transplanted on October 13.

- 第一造試採收期：2024 年 11 月 20 日起（僅施用農夫配方）
  First light harvesting began on November 20, 2024 (Farmer's Formula only).

- CANNABOOST 開始施用：2024 年 12 月 4 日起
  CANNABOOST application started on December 4, 2024.

- 紅蜘蛛出現時間：12 月下旬（初期可控）
  Red spider mites appeared in late December (initially manageable).

- 正式收成期：12 月中旬起
  Main harvest began in mid-December.

- 產量高峰期：2025 年 2 月初至 3 月初
  Peak production occurred between early February and early March 2025.

- CANNABOOST 1L and 5L packaging shown in Figure 1.1.

1.2 試驗目的 / Objective

本研究探討 CANNABOOST 是否顯著提升草莓產量與品質，並確定滴灌與葉面施用方式的最佳效果，旨在為草莓種植者提供優化管理方案。
This study investigates whether CANNABOOST improves strawberry yield and quality, and identifies which application method—drip or foliar—is more effective, aiming to provide optimized strategies for strawberry growers.

1.3 報告結構 / Report Structure

報告內容分為以下章節：
This report is structured as follows:

1. 方法 / Methodology
2. 結果（分為 2024 年 12 月尾至 2025 年 2 月頭，以及全時期 12 月尾至 3 月尾） / Results (Phase 1: Late Dec 2024 – Early Feb 2025; Full Period: Late Dec – End of Mar)
3. 圖表與分析 / Graphs & Analysis
4. 結論與發現 / Conclusion & Findings

二、方法 / Methodology

2.1 試驗方法 / Trial Setup

- 試驗地點：香港綠屋有限公司溫室
  Location: Green House Co., Ltd. greenhouse, Hong Kong

- 溫室面積：約 32 米 × 44 米，1,408 m² 共設 23 條 41 米長種植槽
  Greenhouse area: 32m x 44m, 1,408 m² with 23 growing troughs, each 41m long

- 實驗種植槽數：3 條（每槽間距約 1–2 米）
  Number of experimental troughs: 3 (spaced 1–2m apart)

- 每槽草莓：約 360 株，使用椰糠基質，配合滴灌系統
  ~360 strawberry plants per trough, grown in coco slabs with drip irrigation

- 每槽設有約 41 塊椰糠板，每塊含 9 株草莓
  ~41 coco slabs per trough, each slab holds 9 plants

- 每 8–10 米隨機選 1 塊椰糠板，每組共 5 塊，隨機選 1 株作樣本
  Every 8–10m, 1 slab was randomly selected. From each slab, 1 plant was sampled (15 plants per group)

- 試驗期間：2024 年 10 月 13 日至 2025 年 3 月
  Trial period: October 13, 2024 – March 2025

- **採收期**:2024 年 12 月中旬至 2025 年 3 月

  Harvesting period: Mid-December 2024 – March 2025

2.2 試驗組別與處理方式/ Groups & Treatments

組別 **Group**	處理 **Treatment**	施用方式 **Application**
實驗組一 Drip Group	Farmer's formula + CANNABOOST(2–4 ml/L)	**滴灌**Drip irrigation**每週一、四、六 上午** 10:00 **每袋每日約** 1,560 ml **稀釋肥液** Applied via drip irrigation every Monday, Thursday, and Saturday at 10:00 AM starting December 4, delivering ~1,560 ml diluted fertilizer per coir bag daily, independent of the farmer's formula. (Figure 2.1)
實驗組二 Foliar Group	Farmer's formula + CANNABOOST(2–4 ml/L)	**葉面噴灑**Foliar spray **每週一 晚上** 8:00 **每行噴施** 40 **公升稀釋液** Applied weekly via sprayer every Monday at 8:00 PM starting December 4, using 40 liters of diluted solution per row. (Figure 2.2)
對照組 Control Grou	Farmer's formula No CANNABOOST added **溶液 A**: **硝酸鈣** 67 **公斤、鐵** 27 **公斤、硝酸鉀** 61 **公斤** **溶液 B**: **硫酸銅** 11 **公斤、硫酸鎂** 73 **公斤 等** (Solute A: 67 kg calcium nitrate, 27 kg iron, 61 kg potassium nitrate; Solute B: 11 kg copper sulfate, 73 kg magnesium sulfate, etc	**滴灌**Drip irrigation EC **值** 1.1–1.2 Dilution ratio 1:100 EC 1.1–1.2. , diluted 1:100, EC 1.1–1.2). (Figure 2.2)

2.3 數據採集與指標 / Data Collection & Indicators

每組包含45株植物(每8–10米種植槽隨機選取1株植物，每槽5個椰糠袋，每袋9株)。試驗期間為2024年10月13日至2025年3月，採收期為2024年12月中旬至2025年3月。數據收集內容包括產量(每株果重與果數)、品質(糖度、外觀)以及生長指標(新葉數、結果率)。Each group consisted of 45 plants (1 plant randomly selected per 8–10 m planting trough, 5 coir bags, 9 plants per bag). The trial ran from October 13, 2024, to March 2025, with the harvest period from mid-December 2024 to March 2025. Data collected included yield (fruit weight and number per plant), quality (Brix, appearance), and growth metrics (new leaves, fruit set rate).

2.4 環境影響與病蟲害 / Environmental Factors & Pests

紅蜘蛛輕微感染始於12月4日，至2月初已變得嚴重。對照組出現生長受阻(老葉枯萎、新葉生長受抑、結果率低)，而實驗組受影響較小，1月份的生長略優於對照組，2月初起明顯優於對照組。

Minor red spider mite infestations began on December 4, becoming severe by early February. The control group showed stunted growth (withered old leaves, inhibited new leaves, low fruit set), while experimental groups were less affected, with growth slightly better than the control in January and significantly better from early February.

- **滴灌處理組設置(圖 2.1)**
  Drip Irrigation Group Setup (Figure 2.1)

- **葉面噴灑組及對照組設置(圖 2.2)**
  Foliar Spray and Control Group Setup (Figure 2.2)

三、結果 / Results

3.1 時期 1：2024年12月尾至2025年2月頭

Period 1: Late December 2024 to Early February 2025

指標 / Indicator	對照組 Control	滴灌組 Drip Group	葉面組 Foliar Group	備註 / Notes
甜度 Brix	7.6 → 8.1	7.7 → 8.5	7.56 → 8.66	葉面組甜度最高，2月達8.66 Foliar group had highest sweetness, 8.66 in Feb
果實重量 Fruit Weight (g)	13.5 → 27	13.4 → 28	13.6 → 30	葉面組2月果重最大30g Foliar group had heaviest fruit, 30g in Feb
每株果實數 Fruits / Plant	2.5 → 4	3 → 6	3 → 6	實驗組2月達6顆 Experimental groups reached 6 fruits in Feb
每株花數 Flowers / Plant	6 → 8	6 → 11	6 → 12	葉面組花數最多12朵 Foliar group had most flowers, 12 in Feb
平均總產量 Avg. Yield (g)	58.3	73.5	77.4	滴灌組增產26%，葉面組增產33% 26%–33% yield increase over control

Table 3.1 | Phase 1 Comparison (Late Dec 2024 – Early Feb 2025)

- 圖 3.1 | 第一階段－葉面處理組 Figure 3.1 | Phase 1 – Foliar Treatment Group

- 圖 3.2 | 第一階段－滴灌處理組 Figure 3.2 | Phase 1 – Drip Irrigation Group

- 圖 3.3 | 第一階段－對照組 Figure 3.3 | Phase 1 – Control Group

3.2 全時期：2024年12月尾至2025年3月尾

Table 3.2 | Full Period Comparison (Dec 2024 – Mar 2025)

指標 / Indicator	對照組Control	滴灌組Drip Group	葉面組Foliar Group	備註 / Notes
甜度 **Brix**	7.4 → 78.1 (Avg **7.65**)	7.73→ 8.5 (Avg **7.85**)**+2.6%**	7.45 → 8.66 (Avg **7.93**)**+3.7%**	葉面組甜度最高 Foliar group highest sweetness
果實重量 **Fruit Weight (g)**	9.5→ 27 (Avg **16.63**)	9.5 → 28 (Avg **17.45**)**+4.9%**	10→ 30 (Avg **18.4**)**+10.6%**	葉面組果重最高 Foliar group heaviest fruit
每株果實數 **Fruits per Plant**	2.5→ 4 (Avg **3.38**)	3→ 6 (Avg **4.33**)**+28.1%**	3 → 6 (Avg **4.38**)**+29.6%**	實驗組果數高 Experimental groups outperformed
每株花數 **Flowers per Plant**	6 → 8 (Avg **6.88**)	6 → 11 (Avg **8.25**)**+19.9%**	6 → 12 (Avg **8.63**)**+25.4%**	葉面組花數最多 Foliar group most flowers
Avg 總產量 Avg. Yield (g)	**56.2 g**	**75.5 g+34.3%**	**80.6 g+43.4%**	葉面組產量最高 Foliar group highest yield

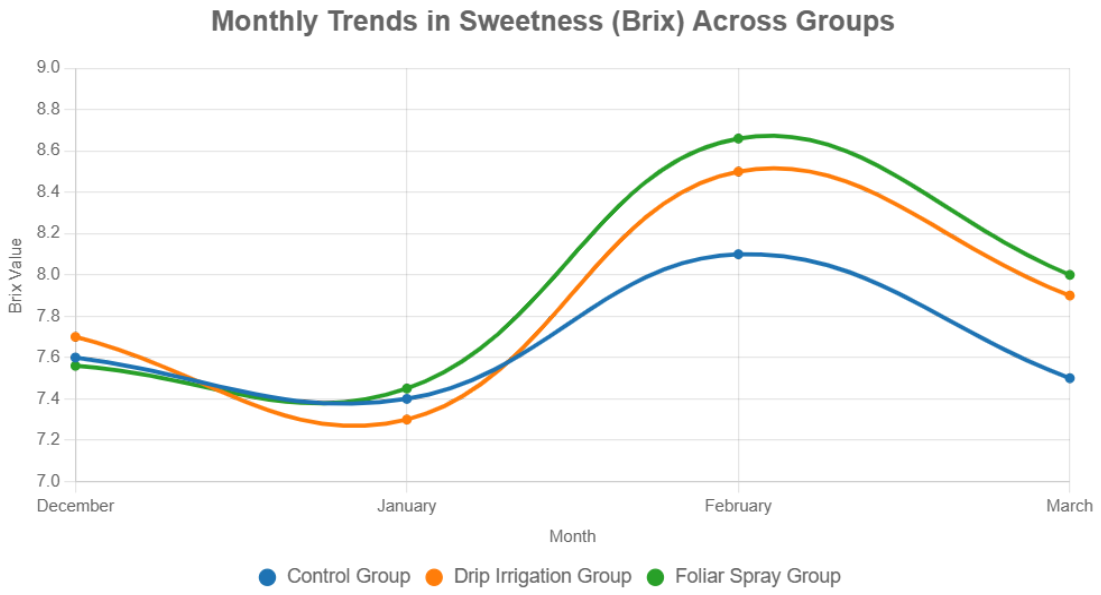
- 圖 3.4 | 全期處理－葉面噴灑組 Figure 3.4 | Full Period – Foliar Treatment

- 圖 3.5 | 全期處理－滴灌組
  Figure 3.5 | Full Period – Drip Irrigation Group

- 圖 3.6 | 全期處理－對照組
  Figure 3.6 | Full Period – Control Group

四、圖表與分析 / Charts and Analysis

4.1 各組甜度（Brix 值）每月趨勢 Monthly Brix trends across groups

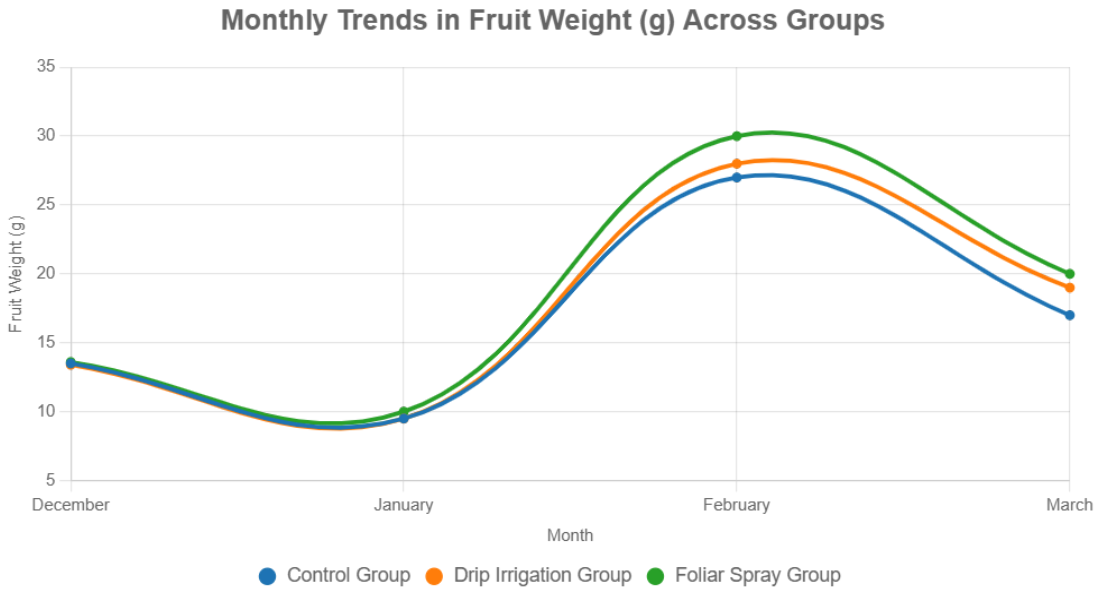


▲Figure 1: Monthly Brix trends across groups

組別 / Group	12 月	1 月	2 月	3 月	平均值 / Avg
對照組 / Control	7.6	7.4	8.1	7.5	7.65
滴灌組 / Drip Group	7.7	7.3	8.5	7.9	7.85
葉面組 / Foliar Group	7.56	7.45	8.66	8.0	**7.93**

▲Table 1: Monthly Brix values across groups

4.2 各組果實重量(g)每月趨勢 Monthly fruit weight trends across groups

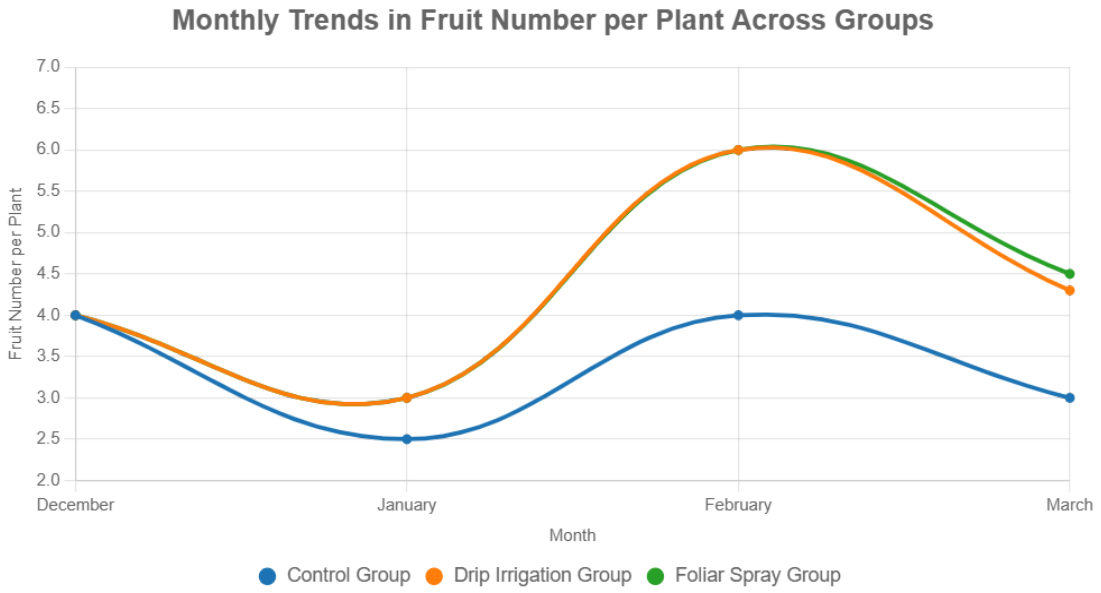


▲Figure 2: Monthly fruit weight trends across groups

組別 / Group	12 月	1 月	2 月	3 月	平均值 / Avg
對照組 / Control	13.5	9.5	27	17	16.63
滴灌組 / Drip Group	13.4	9.5	28	19	17.45
葉面組 / Foliar Group	13.6	10	30	20	**18.4**

▲Table 2 | Monthly Trend of Fruit Weight (g)

4.3 各組每株果實數每月趨勢 Monthly fruit number per plant trends across groups

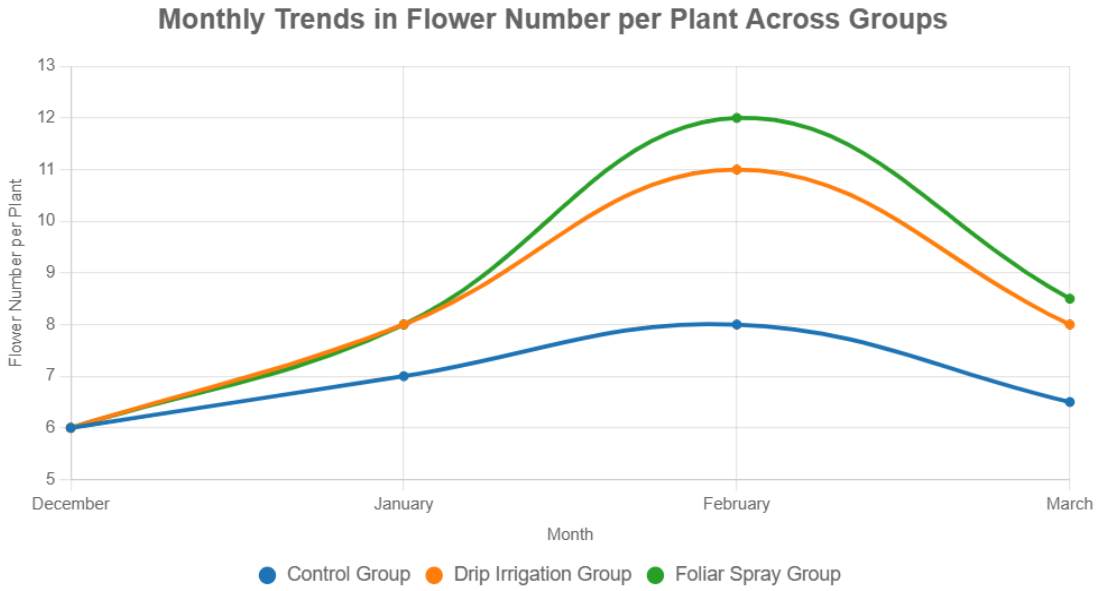


▲Figure 3: Monthly fruit number per plant trends across groups

組別 / **Group**	**12** 月	**1** 月	**2** 月	**3** 月	平均值 / **Avg**
對照組 / Control	4	2.5	4	3	3.38
滴灌組 / Drip Group	4	3	6	4.3	4.33
葉面組 / Foliar Group	4	3	6	4.5	**4.38**

▲Table 3: Monthly fruit number per plant values across groups

4.4 各組每株花數每月趨勢 Monthly Trend of Flowers per Plant



▲Figure 4: Monthly flower number per plant trends across groups

組別 / Group	12 月	1 月	2 月	3 月	平均值 / Avg
對照組 / Control	6	7	8	6.5	6.88
滴灌組 / Drip Group	6	8	11	8	8.25
葉面組 / Foliar Group	6	8	12	8.5	**8.63**

Table 4: Monthly flower number per plant values across groups

4.5 Data Analysis

在第一階段(2024 年 12 月下旬至 2025 年 2 月上旬)中，葉面噴灑組表現出最高的甜度(2 月為 8.66)、果重(2 月為 30 克)、果數(2 月平均每株 6 顆，與滴灌組並列)及花數(2 月為 12 朵)。

During **Period 1** (late December 2024 to early February 2025), the **foliar spray group** exhibited the highest sweetness (8.66 in February), fruit weight (30 g in February), fruit number (6 fruits/plant in February, tied with drip irrigation), and flower count (12 in February).

滴灌組的甜度與果重略低，但整體表現更穩定。

The **drip irrigation group** showed slightly lower sweetness and fruit weight but greater overall stability.

在整個試驗期間(2024 年 12 月下旬至 2025 年 3 月下旬)，葉面噴灑組在平均甜度(7.93)、果

重(20.9 克)與花數(8.63)方面仍領先。
Over the **full period** (late December 2024 to late March 2025), the **foliar spray group** led in average sweetness (7.93), fruit weight (20.9 g), and flower count (8.63).

而滴灌組則在果數(平均每株 4.33 顆)及穩定性方面優勢明顯。
The **drip irrigation group** excelled in fruit number (4.33) and in maintaining consistent performance.

對照組在所有指標中均落後(甜度 7.65、果重 16.63 克、果數 3.38、花數 6.88)。
The **control group** lagged in all metrics (sweetness 7.65, fruit weight 16.63 g, fruit number 3.38, flower count 6.88).

甜度在第一次採收(**12** 月)時達到高峰，並於 2 月上旬後逐漸下降;果實大小則於**2** 月上旬至下旬達到高峰。
Sweetness **peaked during the first harvest (December)** and declined after early February, while **fruit size peaked from early to late February**.

五、結論與發現 / Conclusion and Findings

5.1 試驗結果與發現

5.1 Experimental Results and Observations

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1. 葉面組表現最佳:在平均甜度(7.93)、果重(18.4g)、果實數(4.38 顆)與花數(8.63 朵)皆為三組中最高，估算產量達 **80.6g /** 株，顯示葉面施用 CANNABOOST 對草莓生育與品質具明顯正向效果。
   Foliar group performed best: It had the highest values in average sweetness (7.93), fruit weight (18.4g), fruit count (4.38), and flower count (8.63) among all groups. The estimated yield reached **80.6g per plant**, indicating that foliar application of CANNABOOST had a significant positive effect on strawberry growth and fruit quality.

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2. 滴灌組次之:平均甜度為 7.85，果重 17.45g，果實數 4.33 顆，估算產量為 **75.5g /** 株，略低於葉面組但仍顯著優於對照組，顯示 CANNABOOST 透過滴灌施用亦有提升效果。
   Drip group ranked second: It showed an average sweetness of 7.85, fruit weight of 17.45g, and fruit count of 4.33. The estimated yield was **75.5g per plant**, slightly lower than the foliar group but still significantly higher than the control group, indicating that drip application of CANNABOOST also improved strawberry performance.

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3. 對照組明顯落後：未施用 CANNABOOST 的對照組甜度為 7.65，果重僅 16.63g，果實數 3.38 顆，估算產量僅 **56.2g / 株**，為三組中最低。
   Control group lagged behind: Without CANNABOOST application, the control group had the lowest performance with a sweetness of 7.65, fruit weight of 16.63g, fruit count of 3.38, and an estimated yield of only **56.2g per plant**.

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4. 整體發現：施用 CANNABOOST（無論葉面或滴灌）皆能有效提升草莓果實品質與產量，尤以葉面施用效果最為顯著。
   Overall findings: The application of CANNABOOST—either by foliar spray or drip irrigation—effectively enhanced strawberry fruit quality and yield, with the **foliar application showing the most pronounced benefits**.

5.2 其他發現 Additional Observations

晚間時間，使用 CANNABOOST 的實驗組（特別是葉面組）葉尖出水量及整體濕度較高，表明其促進水分代謝的效果。
During nighttime, the experimental groups treated with CANNABOOST (especially the foliar group) exhibited higher tip exudation and overall leaf humidity, indicating enhanced water metabolism.

此外，CANNABOOST 具抗逆性，實驗組紅蜘蛛影響輕微，長勢從 2 月初顯著優於對照組。
In addition, CANNABOOST appeared to enhance stress resistance. The experimental groups had milder red spider mite infestations, and plant growth was visibly superior to the control group starting from early February.

5.3 其他影響因素 Other Influencing Factors

— 訪客行為：

— Visitor Behavior:
綠屋溫室是一個對外開放的草莓自摘場，訪客行為可能影響實驗結果，例如踩踏或意外採摘樣本植株可能導致數據偏差。
Greenhouse is open to the public as a pick-your-own strawberry farm. Visitor behavior, such as trampling or picking test plants, could have introduced deviations in the data.

— 農藥使用：

— Pesticide Usage:
綠屋使用多種農藥（施用方式及份量統一），可能對實驗結果造成偏差，詳見附件中的農藥列

表以供參考。
Multiple pesticides were used in the greenhouse (with consistent application methods and dosages), which may have affected the experimental outcomes. Please refer to the attached pesticide usage list for details.

— 葉面組噴灑量:

— Foliar Spray Dosage:
每行每次 40L 的份量會令部分 CANNABOOST 肥料經葉面徑流到泥袋中或種植糟中，葉面組植株有機會經根部吸收部分在泥袋或糟中的肥料。
The 40L per row foliar spray may have caused some CANNABOOST to run off into the grow bags or troughs, allowing foliar group plants to absorb additi**onal fertilizer through their roots.**

— 紅蜘蛛影響:

— Red Spider Mite Infestation:
由於綠屋採用有機防治方針，不使用化學農藥。今年草莓生產季的紅蜘蛛問題因場地濕度長期偏低而難以控制，實驗結果可能因此受到影響。
As the greenhouse follows organic pest control protocols and avoids chemical pesticides, red spider mite issues were difficult to manage due to persistently low humidity. This may have affected the experimental results.

場內非實驗組的種植糟不是全部都受紅蜘蛛影響，場內大約五分之二的種植糟受影響。
Not all non-experimental troughs in the facility were affected; approximately two-fifths of the troughs experienced red spider mite infestations.

六、結論與建議

Chapter 6: Conclusion and Recommendations

6.1 結論 Conclusion

本次試驗顯示，使用 CANNABOOST 對草莓植株的生長表現與果實品質具有顯著正面影響。特別是以葉面噴灑方式施用者，其在甜度、果重、果實數與估算產量等指標上均優於其他組別。滴灌組亦有明顯提升效果，而未施用的對照組表現相對較差。
This experiment demonstrated that the application of CANNABOOST significantly improved strawberry plant growth and fruit quality. Notably, the foliar spray method resulted in the best performance across multiple indicators including sweetness, fruit weight, fruit count, and estimated yield. The drip group also showed considerable improvement, while the control group performed comparatively poorly.

此外，試驗期間觀察到 CANNABOOST 對抗逆性亦有助益，表現在紅蜘蛛影響較輕微，整體植

株生長勢更穩定。

In addition, CANNABOOST appeared to enhance stress resistance, notably reducing the impact of red spider mites and maintaining more stable plant vigor throughout the trial.

6.2 建議 Recommendations

1. 生產應用建議：若條件允許，建議以葉面噴灑方式施用 **CANNABOOST**，可獲得最佳果實品質與產量。
   Production Recommendation: When feasible, **foliar spraying of CANNABOOST** is recommended to achieve optimal fruit quality and yield.

2. 滴灌作為替代方案：對於無法頻繁噴灑的場域，可考慮以滴灌方式施用，同樣能帶來穩定成效。
   Drip Application as Alternative: For operations where foliar spraying is not practical, **drip application** can serve as an effective alternative with consistent results.

3. 建議後續試驗：可針對不同濃度、施用頻率與施用時段進行後續試驗，探索最佳施肥模式。
   Future Research Suggestion: Further studies on **different concentrations, application frequencies, and timing** are recommended to fine-tune the optimal fertilization strategy.

4. 控制變因與環境管理：建議未來試驗盡可能減少外界干擾（如訪客行為、非試驗農藥影響），並監控濕度、水分張力等環境因子，以提高數據準確性。
   Control of Variables and Environmental Management: Future experiments should minimize external interference (e.g., visitor behavior, unrelated pesticide usage) and monitor environmental factors such as humidity and water tension to ensure more accurate data.

5. 抗病性評估：建議進一步針對 CANNABOOST 對紅蜘蛛與其他病蟲害的抗性進行評估，了解其潛在的防禦效果。
   Pest Resistance Evaluation: It is recommended to assess CANNABOOST's potential role in enhancing resistance to red spider mites and other pests.

簽發單位：CANNA 與香港綠屋有限公司

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附件:農藥列表

Appendix: List of Pesticides Used During the Trial

以下為試驗期間綠屋溫室使用的農藥，可能影響實驗結果:
The following pesticides were used in the Greenhouse during the experiment and may have influenced the results:

中文名稱（成分）	英文名稱（**Active Ingredient or Description**）
木霉菌	*Trichoderma spp.* (beneficial fungus)
松枝桿菌 (AMF)	*Pinus Bacillus* (Arbuscular Mycorrhizal Fungi - AMF)
枯草桿菌	*Bacillus subtilis*
蘇力菌	*Bacillus thuringiensis* (Bt)
綠油油礦物油	Mineral Oil (Green Oil)
苦楝油	Neem Oil
白僵菌	*Beauveria bassiana*
碳酸氫鉀	Potassium Bicarbonate
碳酸氫鈉	Sodium Bicarbonate (Baking Soda)
橙皮精油	Orange Peel Essential Oil
青皮精油	Green Peel Essential Oil (e.g., lime or unripe citrus)
甲殼素	Chitosan
清源保	Natural Plant-based Cleaner (Qing Yuan Bao / 清源保)
醋液	Vinegar Solution
勞工梘水	Soap Water (Homemade or labor-use soap solution)