

Efficacy Report

04/05/2019

Study Title : Efficacy of “NanoGraphene Fertilizer – FRESH”
in Byeong-kwon Choi’s Tomato Smart Farm

Product Identity : Graphene, nano calcium , nano magnesium , nano iron

Data Requirements : Proof of Tomato Growth effect

Author : Sang-cheol Lee_ Researcher at Smartnano Co., Ltd.

Study completion date : 03/15/2019

Testing Facility

Daesari, Taein-myeon, Jeongeup-si, Jeollabuk-do, South Korea

Laboratory Project Number : ER 19

Byeong-kwon Choi's Tomato Smart Farm in Taein-myeon, Jeongeup-si

Project Number: ER 19

GOOD LABORATORY PRACTICE COMPLIANCE STATEMENT

SUBMITTER : Sang-cheol Lee [Smartnano Co., Ltd.]

(Signature)  Date: 03/15/2019

Typed Name : Sang-cheol Lee

Title : Director

Co-Researched by : Tomato Smart Farm in Daesari, Taein-myeon, Jeongeup-si, Jeollabuk-do, South Korea

(Signature)  Date: 03/15/2019

Typed Name : Byeong-kwon Choi

Title : Farming Specialist

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EFFICACY STUDY SUMMARY

STUDY TITLE: Efficacy of "NanoGraphene Fertilizer – FRESH" in Byeong-kwon Choi's Tomato Smart Farm

LABORATORY PROJECT #: ER 19

TESTING FACILITY: Tomato Smart Farm in Daesari, Taein-myeon, Jeongeup-si,
Jeollabuk-do, South Korea

STUDY DATES:

STUDY INITIATION DATE: (12/15/2018)

STUDY COMPLETION DATE: (03/15/2019)

TEST SUBSTANCE:

DESCRIPTION: Dilute 1 bottle of 500ml "FRESH" 1,000 times with water and used for irrigation application to an area of 3,300m² pour through the additive inlet separate from the nutrient solution container.

INGREDIENT: Graphene G4: 0.75g, nano Ca&Mg: 0.4g, nano Fe: 0.1g

DILUTION: Dilute 1,000 times with general groundwater and apply as the irrigation fertilization

TEST CONDITIONS:

WATER: Groundwater, hardness: 1,000 mg/L or less

CONTACT TIME : Not used

TEMPERATURE : 20°C ~ 27°C (68°F ~ 81°F)

TEST RESULTS :

Control results :

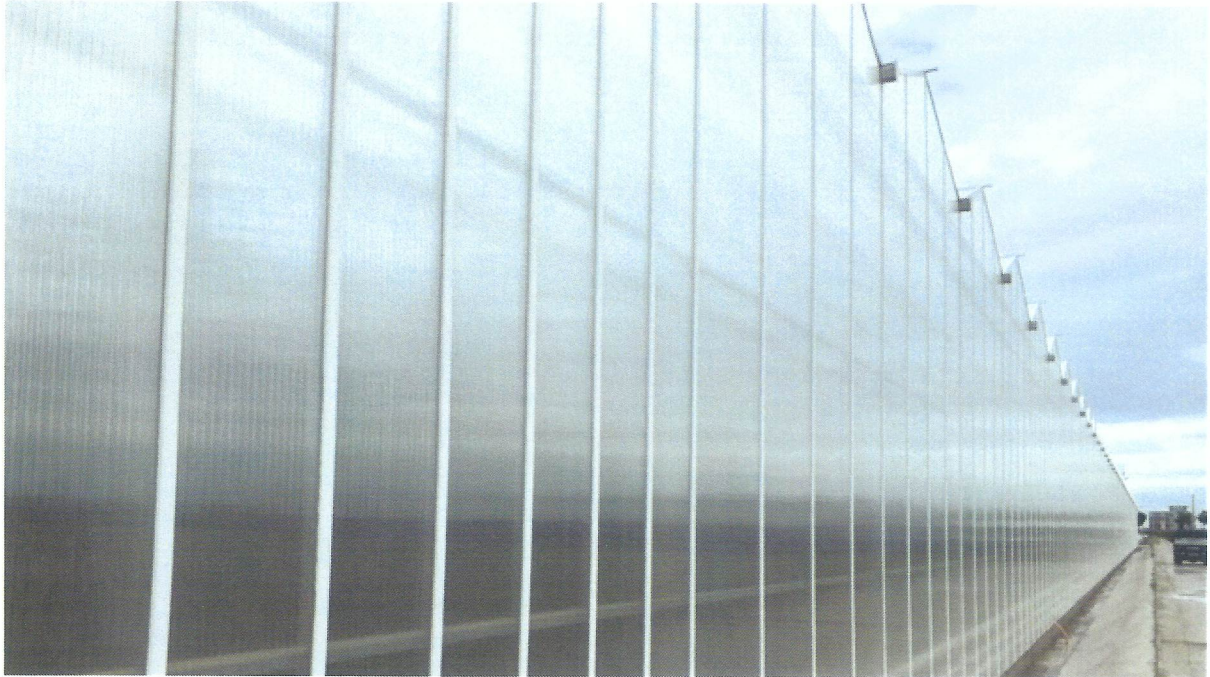
1. The growth condition is very good.
2. The tomatos are larger with improved taste.
3. It helps the absorption of nutrients and trace elements in the nutrient solution

Conclusion :

1. All expected effects of calcium, including tomatos health, quality, disease resistance, and increased yield, were confirmed.
2. It promotes healthy growth by helping the absorption of nutrients, trace elements, and calcium in the nutrient fluid.

Photos at Testing Facility

1) Tomato Smart Farm



2) Fruits are larger and improved taste

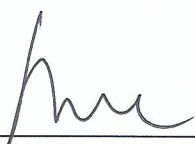


B. QUALITY ASSURANCE STATEMENT

Study Title: Efficacy of "NanoGraphene Fertilizer – FRESH" in Byeong-kwon Choi's Tomato Smart Farm

Study #: ER 19

Quality assurance audits of this study were conducted and reported to management and the director as listed below:

(signature)  _____
Typed Name: Lib Kim
Director of Quality Assurance

DATE: 03/15/2019

C. STUDY REPORT - Detail

STUDY TITLE : Efficacy of "NanoGraphene Fertilizer – FRESH" in Byeong-kwon Choi's Tomato Smart Farm

TEST FACILITY : Tomato Smart Farm in Daesari, Taein-myeon, Jeongeup-si, Jeollabuk-do, South Korea,

TEST SUBSTANCE IDENTIFICATION

TEST SUBSTANCE NAME:(Graphene: Cas No:1034343-98-0, Nano Calcium & Magnesium hydroxide : Cas No: 39445-23-3, Nano iron hydroxide : Cas No: 11113-66-9)

- ① Graphene G4: Cas No: 1034343-98-0; Graphene Layer - Median of single layer ranging from 1 to 5 layer; Graphene size - median size of 20nm, Glycerin-based
- ② Nano Calcium & Magnesium hydroxide: Cas No : 39445-23-3; median size of 5nm
- ③ Nano iron hydroxide: Cas No: 11113-66-9; median size of 5nm

DESCRIPTION OF TEST SUBSTANCE:

'FRESH' : It is a transparent gold-color liquid fertilizer manufactured by mixing highly concentrated Graphene G4 with nano calcium & magnesium hydroxide, and nano iron hydroxide.

It can be stored at room temperature for 2 years and is supplied in various containers from 500ml to 20kg.

CHEMICAL CHARACTERIZATION:

We added a high concentration of Graphene G4 and nano calcium, nano magnesium and nano iron as described above the "test substance name". These are our proprietary materials. Graphene has inherent functions of being a drug delivery system, catalyst and having a chelating effect. Therefore, it delivers a high concentration of molecular-sized nano calcium, nano magnesium, nano iron and other essential trace elements to growing points within plants throughout a plant's growth cycle.

STUDY OBJECTIVE:

It reduces usage by increasing the absorption of nutrient solution, boosts immunity, and strengthens cell walls to ensure increased production.

TEST METHOD:

Cultivation test conducted according to general smart farm nutrient solution usage method

D. STUDY MATERIALS TEST METHOD

PREPARATION OF TEST SUBSTANCE

Dilute 500ml of 'FRESH' 1,000 times in water and inject it into the nutrient solution injection tube using a separate injection port to irrigate the smart farm.

PREPARATION OF TEST SYSTEM/STRAINS

Use a 100 liter plastic container for 1,000-fold dilution.

EXPOSURE CONDITIONS

Dilute 500ml of 'FRESH' 1,000 times in water and inject it into the nutrient solution injection pipe using a separate injection port, and supply it to the smart farm according to the nutrient solution supply schedule.

TEST SYSTEM RECOVERY

'FRESH' is consumed naturally throughout the foliar application, so there is no need for system restoration.

PROTOCOL CHANGES

FRESH is irrigated with nutrient solution according to the nutrient solution supply schedule, there is no change in the protocol.

PROTOCOL DEVIATIONS

If the plant's nutrient movement is not good due to high temperatures, additional foliar application of 'FRESH' is necessary. Other than that, there is no reason to change the protocol.

E. CONTROLS

PREPARATION OF CONTROL(S)

The tests were conducted under identical conditions, dividing the field into two parts. The tests were conducted separately into smart farms that use fertilizers and smart farms that do not use fertilizers.

F. STUDY ACCEPTANCE CRITERIA

STUDY REQUIREMENTS

FRESH is irrigated with nutrient solution according to the nutrient solution supply schedule.

G. DATA ANALYSIS

CALCULATIONS

The amount of increased production is calculated by measuring the weight of tomatoes harvested in smart farm with and without fertilizer.

STATISTICAL ANALYSIS

Statistical analysis was conducted by summing the production volume based on a smart farm with the area of one nutrient tank.

H. STUDY RETENTION

Data Retention

All research data are preserved.

Specimen Retention

Testing facility is permanent. However, agricultural products are not preserved. Therefore, they are replaced with photos and reports.

I. STUDY RESULTS

An increase in production of approximately 30% was confirmed.

Control and neutralization results

About 30% of the nutrient solution remaining in the existing nutrient waste fluid was reduced to less than 5% after using Fresh, increasing the absorption of the nutrient solution. Therefore, an increase in production of approximately 30% per unit area of the tomato smart farm was confirmed.

J. STUDY CONCLUSION

FRESH promotes the healthy growth of plants and increases resistance to diseases by maximizing the movement of nano calcium, nano magnesium, nano iron and other trace elements precisely and continuously. It is a comprehensive bioactive plant agent that helps plants overcome various physiological disorders under adverse growing conditions. Taste of plants and productivity of plant growth are also increased with FRESH.

REPORT SUBMITTED BY:

Dr. Sang-cheol Lee _____
Study director

Study completion date: 03/15/2019

Appendix 1. Photos at Testing Facility





