

Efficacy Report

07/30/2024

Study Title : Efficacy of “NanoGraphene Fertilizer” - ‘BOOSTER’ & ‘NEUTRALIZER’ at Big Green Onion cultivation test

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

Data Requirements : Proof of stimulating growth on Big Green Onion

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

Study completion date : 07/15/2024


Testing Facility

103-26 Ongjeong-ro, Tongjin-eup, Gimpo-si, Gyeonggi-do, South Korea

Laboratory Project Number : ER 21

GOOD LABORATORY PRACTICE COMPLIANCE STATEMENT

SUBMITTER : Dr. Jong-tae Lee [Smartnano Co., Ltd.]

(Signature)  Date: 07/15/2024
Typed Name : Sang-cheol Lee
Title : Director


Research Director : Heon-sang Kim [Graphinus Co., Ltd.]
(Signature)  Date: 07/15/2024
Typed Name : Heon-sang Kim
Title : Farming specialist

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A. EFFICACY STUDY SUMMARY

STUDY TITLE: Efficacy of "NanoGraphene Fertilizer" - 'BOOSTER' & 'NEUTRALIZER' at Big Green Onion cultivation test

LABORATORY PROJECT #: ER 021

TESTING FACILITY: 103-26 Ongjeong-ro, Tongjin-eup, Gimpo-si, Gyeonggi-do, South Korea

STUDY DATES:

STUDY INITIATION DATE: (06/15/2024)

STUDY COMPLETION DATE: (07/15/2024)

TEST SUBSTANCE:

DESCRIPTION: Dilute 1 bottle of 500ml 'BOOSTER' 1,000 times with water and apply foliar application to an area of 3,300m²

INGREDIENT: Graphene G4: 0.75g, nano Ca&Mg: 0.6g, nano Fe: 0.15g

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

DESCRIPTION: Dilute 1 bottle of 500ml 'NEUTRALIZER' 1,000 times with water and used for irrigation application to an area of 660m²

INGREDIENT: Graphene G3: 6g, nano Ca&Mg: 0.4g, nano Fe: 0.1g

DILUTION: Diluted 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 : 21°C ~ 33°C (70°F ~ 91°F)

TEST RESULTS :

Control results :

1. Grows fast and strong compared to comparable species
2. The Big green onions look sturdy, and the leaves and stems are growing well.

Conclusion :

1. Temperature is absolutely essential for nutritional/reproductive growth in high temperature conditions in summer, and has a good ability to overcome high temperatures.
2. It is effective in strengthening immunity against high temperature damage, pests, etc.
3. It was confirmed that the production increased by 15% from 2,565g to 3,005g.

Photos at Testing Facility



Spraying chemical fertilizers

Spraying graphene fertilizers



Spraying chemical fertilizers

Spraying graphene fertilizers

B. QUALITY ASSURANCE STATEMENT

Study Title: Efficacy of “NanoGraphene Fertilizer” - ‘BOOSTER’ & ‘NEUTRALIZER’ at Big Green Onion cultivation test

Study #: Project Number: ER 021

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

(signature) 

Typed Name: Lib Kim
Director of Quality Assurance

DATE: 07/15/2024 _____

C. STUDY REPORT

STUDY TITLE : Efficacy of “NanoGraphene Fertilizer” - ‘BOOSTER’ & ‘NEUTRALIZER’ at Big Green Onion cultivation test

TEST FACILITY : 103-26 Ongjeong-ro, Tongjin-eup, Gimpo-si, Gyeonggi-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 Graphene G3: Cas No: 1034343-98-0; Graphene Layer - Median of 5 layers ranging from 1 to 10 layers; Graphene size - median size of 50nm; Water-based
- ③ Nano Calcium & Magnesium hydroxide: Cas No : 39445-23-3; median size of 5nm
- ④ Nano iron hydroxide: Cas No: 11113-66-9; median size of 10nm

DESCRIPTION OF TEST SUBSTANCE:

‘NEUTRALIZER’: It is a black liquid fertilizer manufactured by mixing highly concentrated Graphene G3 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 ranging from 500ml to 20kg.

‘BOOSTER’: 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:

NEUTRALIZER

: We added a high concentration of Graphene G3 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.

BOOSTER

: 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: By overcoming physiological obstacles, we reduce the use of chemical fertilizers, increase immunity, strengthen cell walls, and confirm increased production.

TEST METHOD: Cultivation test conducted according to general farming methods

D. STUDY MATERIALS TEST METHOD

PREPARATION OF TEST SUBSTANCE

Dilute 1 bottle of 500ml 'BOOSTER' 1,000 times with water and apply foliar application to an area of 3,300m²

Dilute 1 bottle of 500ml 'NEUTRALIZER' 1,000 times with water and apply irrigation application to an area of 660m²

PREPARATION OF TEST SYSTEM/STRAINS

Use of 3,000 liter plastic water tank for 1,000-fold dilution

EXPOSURE CONDITIONS

'BOOSTER' 1,000 times with water and apply foliar application to 3,300m² of land twice a month, 4 times in total.

'NEUTRALIZER' 1,000 times with water and irrigate 1 bottle of 'NEUTRALIZER' 660m² immediately after rotary work in the field , and add 1 bottle after 1 month.

TEST SYSTEM RECOVERY

It improves the soil to one in which plants can grow better (reduced Electrical Conductivity value) by resolving salt accumulation pollution, which prevents crops from growing well due to the accumulation of salts.

PROTOCOL CHANGES

'BOOSTER' is diluted 1,000 times with water applied foliarly to 3,300m² farmland twice a month. If calcium deficiency occurs due to high temperature, additional foliar application need to be performed, so there is no change in the protocol.

'NEUTRALIZER' Dilute water 1,000 times in 500ml and irrigate 660m² of farmland after rotary work before planting. If additional fertilizer spraying is necessary depending on the crop, additional irrigation is performed.

PROTOCOL DEVIATIONS

There is no reason for the protocol to change.

E. CONTROLS

PREPARATION OF CONTROL(S)

Testing was conducted by dividing the area into areas where fertilizer was applied and areas where fertilizer was not applied.

F. STUDY ACCEPTANCE CRITERIA

STUDY REQUIREMENTS

Dilute 1 500ml bottle of 'BOOSTER' 1000 times in water and apply foliar application to an area of 3,300 m².

Dilute 1 500ml bottle of 'NEUTRALIZER' 1,000 times in water and irrigate an area of 660 m².

G. DATA ANALYSIS

CALCULATIONS

The amount of increased production is calculated by measuring the weight of Big Green Onion harvested in testfarm with and without fertilizer.

STATISTICAL ANALYSIS

Statistical analysis was conducted by measuring the weight of one bunch of big green onions sprayed with graphene fertilizer and one bunch of green onions sprayed with chemical fertilizer.

H. STUDY RETENTION

Data Retention

Prepare and preserve research reports.

Specimen Retention

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

I. STUDY RESULTS

Big green onions grown using graphene fertilizer were 3,005g, while Big green onions grown using chemical fertilizer were 2,565g, showing a 440g (15%) increase in yield. It was confirmed that the taste and flavor were improved and that the storage life was increased.

J. STUDY CONCLUSION

NEUTRALIZER

NEUTRALIZER improves the structure of the soil and revitalizes the soil by removing salt accumulation. It also stimulates nitrogen (N), phosphorus (P) and potassium (K) within the soil.

BOOSTER

BOOSTER 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 BOOSTER.

REPORT SUBMITTED BY:

(Signature) 

Date: 07/15/2024

Typed Name : Sang-cheol Lee

Title : Director

Appendix 1. Photos at Testing Facility



