6/1/2020

# The Use of Bio-Stimulants in Enhancing Fruit Yield and quality in Cantaloupe melon (Cucumis melo L.) Grown under greenhouse conditions in the UAE

A Joint Research Project Between

Al Foah Research Farm (Al Ain), College of Food and Agriculture, UAE University
and
INAGROSA Bio-Stimulants Company (Spain) and
Taurus Environmental Consulting, LLC (Al Ain)

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## SUMMARY

Key constrains to sustainable food production in the UAE are the hyper-arid climate with a mild winter and extremely hot and humid conditions over the UAE coast in summer. While remarkable dry inland, where temperatures may reach over 48° C, with a mean annual soil temperature around 22° C. Rainfalls are low and erratic mainly in winter, and evaporation may reach 11 mm/day during the summer. Soils are generally coarse sandy; the arable land is scarce with remarkable shortage of good quality irrigation water, mostly saline. Moreover, the cultivation fields are prone to different pest, diseases and virus vector. Extreme environmental conditions that demand the continuous seeking of efficient methods to enhance farming productivity, its sustainability, and economic value. Strengthening the role of the applied research to bring up suitable and cost-effectiveness solutions.

As known, plants derive essential nutrients from the soil or through fertilizers, manures, and amendments, and that a bulk of the soil solid fraction, constituted by soil minerals exerts significant direct and indirect influences on the supply and availability of most nutrients elements, macronutrients and micronutrients. Thus, the soil nutrient role is even more relevant for a suitable plant growth in the UAE hyper-arid conditions with poor soils, coarse eroded sandy and extreme temperatures.

In such regards, INAGROSA (Spain based company) has developed a wide range bio-stimulants (free amino acids combined with diverse mixed nutrients´), which are characterized by having a quick intake absorption by the plants, with a very small molecule size (300 NM in comparison to over 1,000 NM in other commercial amino acids). These bio-stimulants -among others- act as soil fertility and plant-metabolism enhancers at low-dosage which combined with its quick absorption make thereto highly effective in terms of cost and high-yield (quantity, and quality), and being fully organic and eco-friendly.

To evaluate the effects of the INAGROSA bio-stimulants on yield enhancement and growth under conditions in the UAE, Cantaloupe melon (Cucumis melo L.) was selected as an economic crop for trial under greenhouse conditions at Al Foah Research Farm in Al Ain that belongs to the College of Food and Agriculture at UAE University. Seeds of Cantaloupe were planted under standard greenhouse system (which has a size of 9 by 34 meters and cooling pads system) in mid-June 2019. The trials consisted of two rows of cantaloupe plants at 80 cm spacing treated with accurate bio-stimulant doses, combined with nutrients' mixes. The type and doses were varying on every phenological stage and with the emergence of pathogens, and other abiotic source stress. Two rows of cantaloupe were kept as control and treated with conventional fertilization program as per the recommendation of the agricultural authorities in the UAE and the common practice in the region. The conducted treatment was expected to impact directly and indirectly on the plant's metabolism, affecting its physiological and biological processes (synthesis of proteins and enzymes, chlorophyll and hormones precursors formation, and - inter alia- its ability to chelate microelements to a better absorption).

The results revealed highly significant positive effects on all observed traits. The rows treated with the bio-stimulants showed 40% increase in harvested fruit yield in comparison to the conventionally treated control row. Total fruit yield in the two rows treated with bio-stimulants reached 129 kg in comparison with 78 kg for the conventional treatment. In addition, mean fruit number per row ranged between 29-32 in treated rows and 24-30 in traditional practice.

Similarly, individual fruit weight ranged from 0.7 to 3.7 kg per fruit in treated rows (STD 0.895) with 67% of the fruits has weight above 2 kg, while fruit weight in control treatment ranged from 0.9 to 2.15 kg (STD 0.56) with only 22%of the fruits has weight above 2 kg. The taste and other organoleptic features were remarkable with good consistency with the expected from the variety: extremely sweet and tasty with lasting and resistant fruits.

***Based on the obtained results, as the overall plant growth, fruiting, and harvesting period, it is concluded that it is feasible to grow summer melon under controlled greenhouse conditions in UAE, and obtain suitable production yield with good quality uniform fruit during the summer months to market from August to October, when the local market seems having better prices. In short, most of the observed traits encourage keep improving the treatment protocols and farming practice, by adjusting product mix and doses on the observed stress conditions, to reach better yields through recurrent practice to become on a recommended summer profitable option.***

## Highlights of Progress Report

**Progress Report:** Free Amino Acid treatment effect on Mid-June sowed Cantaloupe.

**Research Director:** Dr Abdulla Dakheel

**Localisation:** 24°21'39.56''N 55°48'03.21''N

**Involved Entities:**

- *Al Foah Research Farm, Food & Agriculture College, UAE University*
- *Taurus Environmental Consulting, LLC*
- *INAGROSA*

**Category:** Science-Based Agrifood Business Development, Scientific Facilities, Agriculture production. Environmental, Food-processing industries, Building Capacities & Technology Dissemination

**Theme:** *Agri Food Infrastructure Development, Science and Technology System, reinforce of commercial channels, competitiveness and employment, rural development*.

## Crop: Cantaloupe melon

«Silver World» is an oriental sweet melon hybrid variety, vigorous and an adaptable to hot and humid conditions, with high sugar content about 15-18%. Fruit is a globe or flat globe, uniform size with greenish withe skin, the flesh is light green, sweet and crispy, weighing about 1.5 to 2.0 kg, and matures after 38-45 days after flowering.

## Treatment Purposes

The treatments with the INAGROSA bio stimulants (free amino acid combined with specific nutrients) have sought in providing an accurate response to the plant nutritional requirements in every phenological stage and enhancing the RNA and RNA-polymerase synthesis for overcoming the stress effects and eventual disorders. Besides, it pursued to favour a quick rooting, with a suitable foliar-area production, timely flowering, fruit set, and fruiting with a uniform quality and size.

## Objective and Contribution of the Project

Serve as an efficient solution allowing the vegetable growing during the extremely hot months; also seeks to optimize the resource uses, which remains inactive or underused during the harsh season, and ensure a quality food production with emphasis on Science-Based Agri-Food Business Development.

## Demonstration Programme and Main Trial Results

**Demonstration Greenhouse Unit:**

- Planting Blocks: 2-rows 45-plant block treated with INAGROSA, and 2-rows 45-plant block treated with conventional fertilization.
- Sowing date: 11/06/2019.
- Transplanting: 26/06/2019
- First Harvest: 08/08/2019
- Final Harvest: 06/10/2019

**Main observed Results**

- **Bio-stimulant treated rows showed:**
  1. Forty percent increase in harvested fruit yield over the rows with conventional fertilization (129 kg vs. 78 kg).
  2. Mean fruit number per row reached 31 in comparison with 27 in traditional practice.
  3. Average single fruit weight in treated rows was 33% higher than control rows (2.1 kg vs. 1.4 kg).
  4. 67% of the fruits has weight above 2 kg in treated rows in comparison with 22% in the control plant.
  5. Long lasting fruit in storage, and high solid soluble content.

## Follow Up Plans

The observed results revealed highly significant positive effects on all traits observed that encourages conducting further trials regarding the treatments doses, and distribution over the phonological stages.

The Use of Bio-Stimulants in Enhancing Fruit Yield and quality in Cantaloupe melon (Cucumis melo L.) Grown under greenhouse conditions in the UAE

## 1. Background

The UAE´s climate is characterized by low and erratic rainfall with high temperatures reaching over 46° in summer, and as low 8° C in winter. The relative humidity is high at the coast reaching to about 98%, whilst falling to 10% inland with an evaporation values reaching 11 mm/day. Arable land is scarce with coarse sandy soils. No doubt, remarkable constrains for farming, even more during the harsh summer weather, which in combination with other limitations (suitable soil areas, access to quality water, and the presence of different diseases, pest and virus vector) force to continuously seeking new methods allowing to enhance the farming production with sensible and efficient results on productivity sustainability and economic value.

The wide range bio-stimulants (free amino acids combined with diverse mixed nutrients´), developed by the Spanish INAGROSA company, are characterized by having a quick plant absorption with a very small molecule size (300 NM in comparison to over than others 1,000 amino acids). Those bio-stimulants act as soil fertility and plant metabolism enhancers, particularly in extreme conditions and strong stress conditions, its quick absorption and high purity allow using at very low doses make such stimulants highly effective in terms of cost and high-yield production (quantity, and quality) with a fully eco-friendly products.

The above bio-stimulants has presented a suitable option to explore to expand the growing calendar over the summer months by cultivating Cantaloupe melon; a summer-tolerant crop can contribute to enhancing an idle resource utilization during the summer months, wherein most facilities, equipment, and land remain under-used due to high temperatures in GCC.

Abiotic factors that constrain the melon UAE crop are extreme weather conditions, soil type, and excessive pesticide use, the S and Mg deficiency, soil structure decline, soil hardpans, poor soil aeration, high soil salinity, high water salinity, water high carbonates in irrigation, excessive irrigation and fertilization. In addition to several disease with particular reference to Cucurbit Yellow Stunting Disorder Virus (CYSDV) that can infect members of the family Cucurbitaceae, including all types of melons, summer and winter squash, pumpkins, gourds, and cucumbers in the UAE (Ahmed A. Hessan and James E. Duffus, 1990)

Therefore, as a moderately tolerant crop to salinity and high temperature, melon crop can be growing in summer with different yield profiles depending on its genotype, environmental conditions, and plant stress severity whose consequences may be mitigated by a suitable nutrition balance including specific free amino acids with at every phenological stage.

## 2. Treatment purpose

The INAGROSA bio-stimulants (free amino acids combined with diverse mixed nutrients´) were choosing since its proven high quality, purity and performance over than 30 years within hyper-arid environments, whose products were mitigated the osmotic-stress adverse effects allowing plant growth with a suitable production. The treatment protocol aimed at evaluation of the effects of combined specific low doses amino acids with nutrients over the crop cycle by applying the fourth generation biotech products. ***Silver World*** melon variety was selected for the evaluation. It is well-adapted variety to the region, sweet, round, with good shipping and storage traits (details of the variety are given in Annex III).

The INAGROSA´s free amino acids, in addition to having a quick intake absorption by the plants, fulfill several physiological functions outlined below:

- Chlorophyll precursor.
- Essential microelements source.
- Regulate the plant water balance
- Improve the plant's ability to withstand harsh
- stress conditions due to extreme temperatures, water lack, salt excess
- Strengthen cell walls by producing more resistant tissues
- Improve the pollen fertility.
- Stimulates the growth processes of meristems root, foliar and floral.
- Enhances root sprouting
- Hormonal Plant metabolism
- Natural Nitrogen source that can be transforming into other amino acids following the transaminases model.
- quick and higher nutrient absorption;
- It is a lignin precursor, which confers resistance to the stems.
- Viruses resilience boosting
- Chelating function, facilitating other component absorption by the plant;
- greater nutrient assimilation by plant cells;
- Growth stimulation, ripening accelerating, productivity enhancement.
- Etc.

The details of the products names, main features and impact, and composition are given in Annex II. The products fall within the “bio and organic liquid fertilizer class” because of those “free amino acids" are bioactive (-NH3+) with (COO- Zwitterions), and 100 % pure with a very small molecule size (300 NM in comparison to over than others 1,000 amino acids). Thereby, act as soil fertility enhancers at low-dosage with a quick absorption, which is highly effective in terms of cost and high-yield production (quantity, and quality) with a fully eco-friendly impact.

## 3. Demonstration Protocols and Treatments

The treatments were applied on two-rows (45 plants in each row), keeping two identical rows treated with conventional fertilization method. The demonstration was conducted in a standard greenhouse (9 x 34 meters) with cooling & ventilation system.


The trials were initiated on June 11, 2019. The melon seeds were treated prior to sowing by submerging into a solution with AMINOL FORTE @ 1 ml per 1-L water for 30 minutes. The treatment seeks to boost the seed germination process by the aminol actions, as well as promote the root sprouting, and favoring the quick absorption to other nutrient elements´ by the plants.
Transplanting the seedling was done on June 27$^{th}$, 2019. Harvest started in August and continue until October 5, 2019. Plants were removed while still in production in order to conduct another scheduled crop trials in the greenhouse. It should be highlighted that the row next to the wall with direct sun lighting wall have had plant losses, showing the negative effect of the extreme sun exposure

Different treatments were applied over every phenological phase, and according to the particular plant stress-conditions under accurate protocols and doses as indicated in Table 1 below.

**Table 1- The applied treatment and doses at each phenological stage**

| Growth Period | Date | Treatment | Product | Dose | Pathogens & others |
|---|---|---|---|---|---|
| Vegetative Growing | 8/7/2019 | spraying | HUMIFORTE 20 | 0.5 ml /L | |
| Vegetative Growing | 16/7/2019 | spraying | M IMPACT | 1.5 ml / L | |
| Blossoming | 22/7/2019 | spraying | HUMIFORTE 20 | 1.5 ml / L | |
| Flowering | 23/7/2019 | spraying mix | AMINOL FORTE | 0.75 ml / L | Aphids |
| Flowering | 23/7/2019 | spraying mix | CONFIDOR | 0.75 ml/ L | Caterpillars |
| Flowering | 24/7/2019 | spraying | AMINOL FORTE | 0.3 ml / L | |
| Flowering | 24/7/2019 | spraying | FOSNUTREN | 0.50 ml /L | |
| Flowering | 31/7/2019 | spraying | AMINOL FORTE | 0.03 ml/ L | |
| Fruit setting | 5/8/2019 | spraying | AMINOL FORTE + IRON | 0.3 ml /L; 250 ml /100 L | |
| Fruiting | 08/08/2019 | spraying | ECOTROL | 100 ml/100 L | |
| Fruiting | 18/8/2019 | spraying | FOSNUTREN | 1ml / L | |
| Fruiting | 18/8/2019 | spraying | KADOSTIM | 1ml/L | |
| Fruiting & Harvesting | 20/8/2019 | spraying | CONFIDOR + AMINOL FORTE | 0.50 ml /L; 0.075 ml/ L | Red spiders |
| Fruiting & Harvesting | 6/9/2019 | spraying | CONFIDOR | 0.75 ml/ L | |
| Fruiting & Harvesting | 10/9/2019 | spraying | M IMPACT | 0.5 ml / L | |
| Fruiting & Harvesting | 15/9/2019 | spraying | KADOSTIM | 0.7 ml/ L | |
| Fruiting & Harvesting | 29/9/2019 | Spraying | KADOSTIM | 0.7 ml/ L | |

## 4. Results and Conclusions

### *A. Fruit Yield*

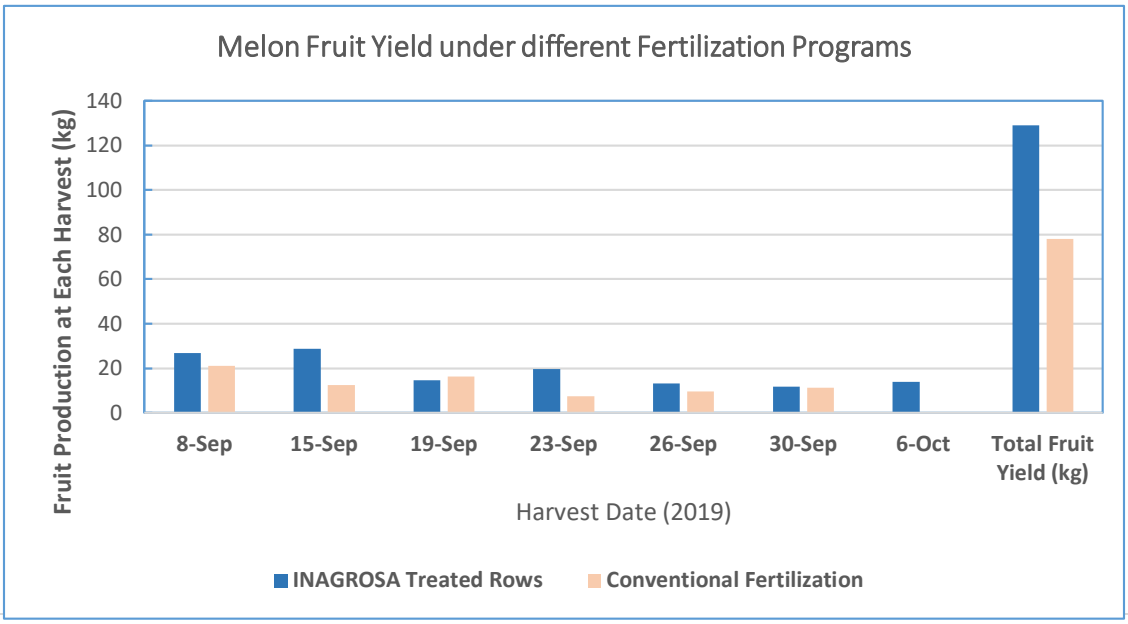
The bio-stimulants treated rows showed highly significant positive effects on all yield and growth traits observed. The treated rows showed 40% increase in harvested fruit yield in comparison to the control rows, fertilized traditionally. Total melon fruit yield in the two treated rows reached 129 kg in comparison

with 78 kg in the control rows (Table-2). Moreover, treated rows had longer productive phase than the control by more than 10 days, the production in the control was still active when the experiment was terminated due to scheduled use of the greenhouse (Figure 1).

**Table 2. Total and per cut melon fruit yield in treated and control rows grown under greenhouse conditions during the summer of 2019**

| Melon Fruit Yield at Each Cut (kg) | | | | |
|---|---|---|---|---|
| Cut number | Bio-Stimulants Treated | | Conventional Control | |
| | Row 1 | Row 2 | Row 3 | Row 4 |
| Cut 1 | 17.96 | 9 | 17.6 | 3.5 |
| Cut 2 | 12.17 | 16.7 | 7.1 | 5.36 |
| Cut 3 | 9.2 | 5.4 | 6.2 | 10 |
| Cut 4 | 3.8 | 15.8 | 3.5 | 4 |
| Cut 5 | 4.2 | 9 | 4.1 | 5.4 |
| Cut 6 | 9 | 2.8 | 5 | 6.2 |
| Cut 7 | 5.75 | 8.25 | 0 | 0 |
| Total Fruit (kg/row) | 62.08 | 66.95 | 43.5 | 34.46 |
| Grand Total/2 Rows | 129.03 | | 77.96 | |
| Ratio= Untreated/ Treated | 60.42% | | | |
| Increase in Fruit Yield (%) | 39.58% | | | |

**Figure 1- Total melon fruit yield at each harvest under different fertilization programs**



Similarly average plant weight and plant parts of melon under treatment with the bio-stimulants were higher by 21% than the control plants (Figure 2).

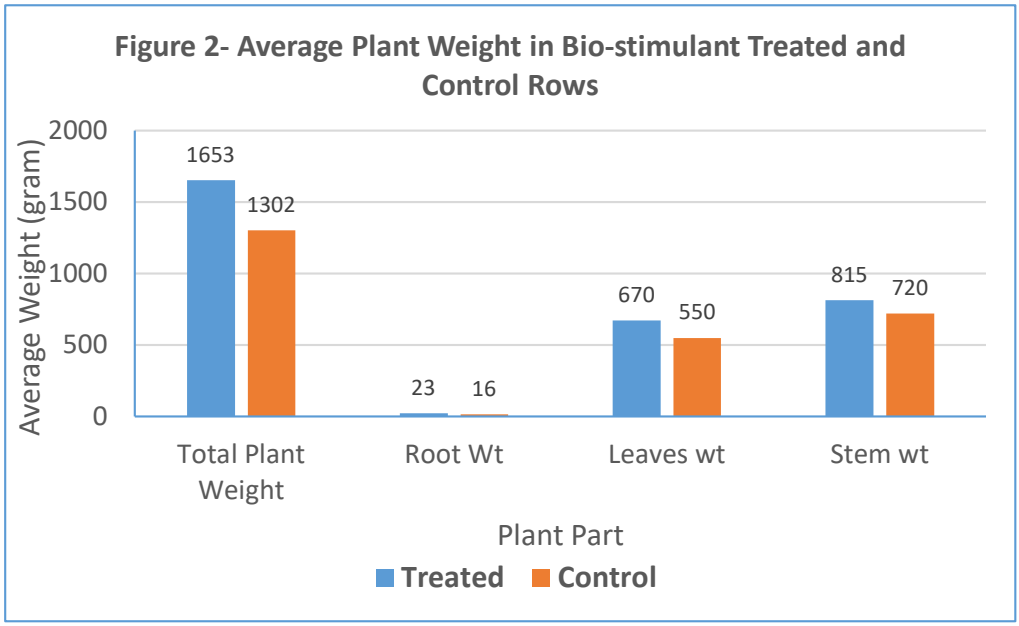
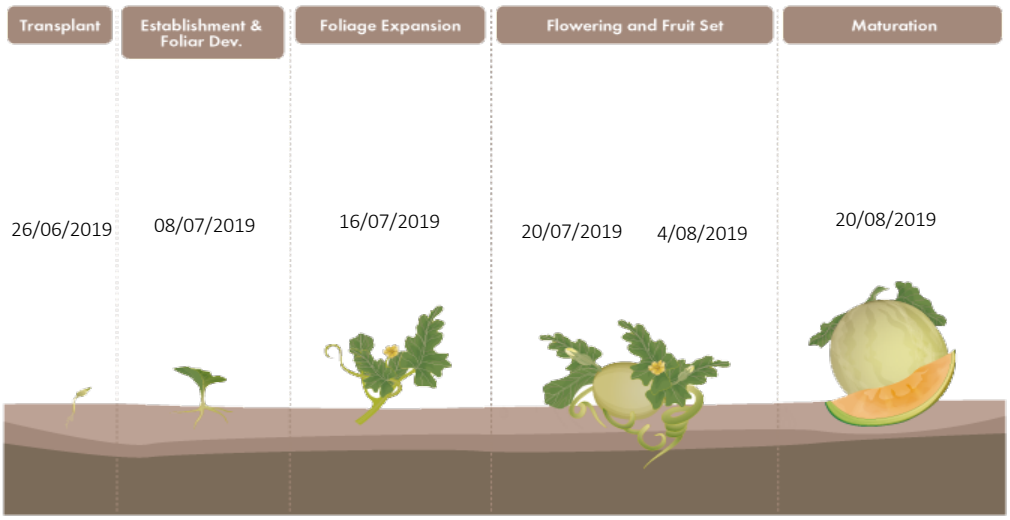



Figure 3- Greenhouse: Treated and untreated rows under controlled temperature & humidity, and shadow Transplanted on June 26 2019


Phenology calendar




### *B. Fruit number and weight*

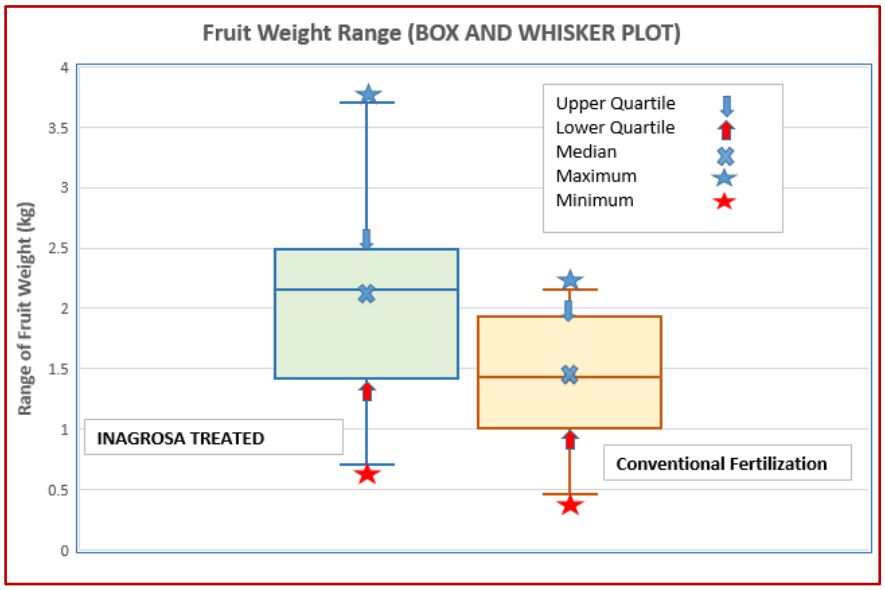
Mean fruit number per row ranged from 29-32, with average 31 fruit in treated rows and 24-30 with average 27 fruit in traditional practice. However, individual fruit weight ranged from 0.7 to 3.7 kg per fruit in treated rows with mean value of 2.11 kg (STD 0.895), while fruit weight in control treatment ranged from 0.9 to 2.15 kg with mean value of 1.42 (STD 0.56) (Table 3).

**Table 3- Average melon fruit weight in treated and control plants**

| Treatment | Row | Single Fruit Weight (kg) | Treatment | Row | Single Fruit Weight (kg) |
|---|---|---|---|---|---|
| INAGROSA | A-1 | 2.03 | TRADICIONAL | C-1 | 2.15 |
| | A-2 | 2.42 | | C-2 | 2 |
| | A-3 | 2.2 | | C-3 | 1.3 |
| | A-4 | 2.1 | | C-4 | 1.53 |
| | B-1 | 3.7 | | D-1 | 0.45 |
| | B-2 | 2.5 | | D-2 | 1.7 |
| | B-3 | 1.2 | | D-3 | 1.32 |
| | B-4 | 0.7 | | D-4 | 0.9 |
| | Mean WT (kg/Fruit) | 2.11 (STDEV= 0.896) | | Mean WT (kg/Plant | 1.42 (STDEV= 0.56) |

Box and Whisker Plot of the fruit weight data showed that despite the wide range in single fruit weight in the bio-stimulant treated rows, 67% of the fruits has weight above 2 kg, while in the conventionally treated rows only 22%of the fruits has weight above 2 kg. The results once more showing the positive effects on fruit yield and marketing characters of the treated plants (Figure 4). The taste and other organoleptic features were remarkably superior with good consistency in the treated plants along the expected characteristics from the variety; it was extremely sweet and tasty with lasting taste and shelf life of the fruits.

**Figure 4- Box and Whisker Plot of Fruit Weight Data in Treated and Untreated Plants**




## C. Conclusions

The initial evaluation of the impact of the selected bio-stimulants showed significant effects on fruit yield enhancement, quality and durability of the fruit storage life. The variety used (Silver World) is a well-adapted variety to the local environmental conditions, however when planted during the summer months the range of temperature and humidity inside the greenhouse is higher than the optimal growth temperature of 30 $^{o}$C during the day and from 18 to 22 ºC at night required by the melon variety. Such requirements limits the economic success of production of melon during the summer even under greenhouse conditions (Annex I). Therefore, using the bio based plant stimulants at low rates (and consequently low cost) that have significant improvement in yield, even when temperature can go above 40 $^{o}$C inside the greenhouse at midday and high humidity at night, represent a viable option to grow profitably melon under greenhouse conditions during the summer months in the UAE. The positive results and impact of the INAGROSA Bio-stimulant compound on yield enhancement in Melon requires further evaluation and repetition in summer 2020, such evaluation is already underway.

## Annexes

### Annex I- Weather indices in Al Ain area (UAE)

| Climate data for Al Ain International Airport (1995–2017) [hide] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
| Record high °C (°F) | 31.8 (89.2) | 36.6 (97.9) | 42.9 (109.2) | 44.4 (111.9) | 49.3 (120.7) | 49.0 (120.2) | 49.2 (120.6) | 48.8 (119.8) | 47.8 (118.0) | 43.1 (109.6) | 37.5 (99.5) | 35.0 (95.0) | 49.3 (120.7) |
| Average high °C (°F) | 24.8 (76.6) | 27.5 (81.5) | 31.5 (88.7) | 37.0 (98.6) | 42.2 (108.0) | 44.6 (112.3) | 44.9 (112.8) | 44.6 (112.3) | 41.9 (107.4) | 37.7 (99.9) | 31.5 (88.7) | 26.9 (80.4) | 36.3 (97.3) |
| Daily mean °C (°F) | 18.4 (65.1) | 20.6 (69.1) | 24.1 (75.4) | 29.0 (84.2) | 33.7 (92.7) | 35.9 (96.6) | 37.0 (98.6) | 37.1 (98.8) | 34.2 (93.6) | 30.3 (86.5) | 24.8 (76.6) | 20.3 (68.5) | 28.8 (83.8) |
| Average low °C (°F) | 12.7 (54.9) | 14.4 (57.9) | 17.3 (63.1) | 21.5 (70.7) | 25.5 (77.9) | 27.8 (82.0) | 30.0 (86.0) | 30.5 (86.9) | 27.4 (81.3) | 23.6 (74.5) | 18.9 (66.0) | 14.7 (58.5) | 22.0 (71.6) |
| Record low °C (°F) | 5.6 (42.1) | 5.9 (42.6) | 9.9 (49.8) | 13.2 (55.8) | 18.0 (64.4) | 20.9 (69.6) | 22.8 (73.0) | 21.9 (71.4) | 21.8 (71.2) | 16.2 (61.2) | 13.0 (55.4) | 7.4 (45.3) | 5.6 (42.1) |
| Average rainfall mm (inches) | 11.6 (0.46) | 4.7 (0.19) | 19.1 (0.75) | 5.9 (0.23) | 0.7 (0.03) | 0.7 (0.03) | 5.5 (0.22) | 1.6 (0.06) | 0.9 (0.04) | 0.6 (0.02) | 1.7 (0.07) | 8.3 (0.33) | 61.3 (2.41) |
| Average relative humidity (%) | 63 | 55 | 48 | 36 | 30 | 33 | 37 | 35 | 39 | 43 | 53 | 61 | 44 |
| Source: National Center of Meteorology[31] | | | | | | | | | | | | | |

## Annex II. Bio Fertilizers: Description & characteristics

### 1. Products

| Products | Main Features | Guaranteed main components | |
|---|---|---|---|
| AMINOL FORTE | 19 free amino acids liquid formula with quick absorption that boost and regulates the plant metabolism, to be applied over any phenological phase, either by dripping, foliar spraying, root spraying<br><br>Especially indicated in crop recovery by adverse and severe stress (transplanting, transporting, biotic or abiotic stress, toxicities by chemical agents, or pest damage). | TOTAL NITROGEN (N)<br>Organic Nitrogen<br>19 free amino acids | 1.1% p/p<br>0.3% p/p<br>6.0% p/p |
| HUMIFORTE | High tech nutrient complex with biologically active synthesized free amino acids and low molecular weight oligopeptides immediately absorbed through leaves or the root system. It also provides N, P,K humic and fluvonic acids along with bio active synthesized free amino acids to the plant quickly with stunning results. Acts by fostering vital plant functions, facilitating the formation of proteins. Enhances fertility and soil structure, is absorbed by the root or leaf, suitable by dripping, foliar spraying, and soil irrigation. | TOTAL NITROGEN (N)<br>Organic nitrogen<br>$P_2O_5$ (soluble in water)<br>K2O (soluble in water)<br>Free amino acids (by synthesis process) | 6.0% p/p<br>0.3% p/p<br>3.0% p/p<br>5.0% p/p<br>5.0% p/p |
| FOSNUTREN R | FOSNUTREN-20 R boost the root formation and growth, provides a well-balanced and enriched amino acid profile with Glutamic Acid, Aspartic Acid and Arginine. | TOTAL NITROGEN (N)<br>Organic nitrogen<br>P2O5 (soluble in water)<br>Free amino acids (by synthesis process) | 4.0% p/p<br>0.3% p/p<br>6.0% p/p<br>2.0% p/p |
| FOSNUTREN | L-amino acid specific profile + oligopeptides + phosphorous in higher content than the rest, regarding to be applied (sprayed) for root system enhancing or for overcoming the transplanting stress and pre-flowering and flowering stage.<br>Especially suitable for crops wherein take use its flowers and fruits. | TOTAL NITROGEN (N)<br>Organic nitrogen<br>P2O5 (soluble in water)<br>Free amino acids (by synthesis process) | 4.0% p/p<br>0.3% p/p<br>6.0% p/p<br>2.0% p/p |
| KADOSTIM | L-amino acid specific profile + oligopeptides + potassium in higher content than the rest, regarding to be applied for filling the fruits in the ripening stage, increasing the sugar, oil, starch, proteins content and fruit storing/transportation resistance or enlarging shield life. | TOTAL NITROGEN (N)<br>Organic nitrogen<br>K2O (soluble in water)<br>Free amino acids (by synthesis process) | 4.0% p/p<br>0.3% p/p<br>6.0% p/p<br>2.0% p/p |
| CONFIDOR | Active ingredients from the chloronicotinyl insecticides (syn. neonicotinoids). Confidor® has an acute, contact and stomach effect and has a mode of action, different to organophosphates, carbamates and pyrethroids, acting on the same target side as acetylcholine receptor agonists. | Confidor® SL 200 is a soluble concentrate containing imidacloprid 200 g/l | |
| ECOTROL PLUS | A broad-spectrum botanical insecticide/miticide for use in agriculture, fruits, nuts, vegetables, ornamentals, landscapes, turf, greenhouses, and nurseries.<br><br>Butyl lactate, Isopropyl myristate, Polyglyceryl oleate, Isopropyl alcohol, Vanillin | Rosemary Oil<br>Geraniol<br>Peppermint Oil<br>Other<br>Total | 10%<br>5%<br>2%<br>83%<br>100% |

**Annex III. Characteristics of Cantaloupe Variety: Melon Silver World**

- **Plant type:** Honey Dew
- **Shape:** Round
- **Fruit Weight (Kg):** 1.3~2
- **Length x width (cm):** 16.4 ×15
- **Appearance:** White skin
- **Flesh color:** White- Green
- **Brix (%):** 13-15
- **Harvest from flowering:** 35
- **Shipping & Storage:** Good
- **Disease resistance:** Fusarium R2
- **Days from sowing:** 75
- **Optimal temperatures (Celsius):** 30° C

## Acknowledgement

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