THE EFFECTS OF MICRONUTRIENT FOLIAR FERTILIZERS ON CERTAIN PHYSIOLOGICAL TRAITS AND YIELD OF CHERRY TOMATO (*LYCOPERSICUM ESCULENTUM* MILLER.) GROWN IN THANH HOA PROVINCE, VIETNAM

Le Van Trong[1], Nguyen Thi Van[1], Ha Thi Phuong[2], Le Thi Huyen[2], Ha Thi Huong[3], Soukchay Vilaykham[1]

Received: 27 April 2025/ Accepted: 12 August 2025/ Published: 25August 2025

Https://doi.org/10.70117/hdujs.E10.08.2025.903

1

Abstract: *This paper presents the research results on the effects of micronutrient foliar fertilizers on certain physiological traits and yield of cherry tomato variety grown under rain-sheltered conditions in Thanh Hoa province, Vietnam. The findings show that in experimental formulas such as F2 (Ev05 Humi pro), F3 (Hd 99), F4 (Etda Zinc), and F5 (Ac-Gaba-Cyto), cherry tomato plants exhibited better growth and development compared to the control (Formula 1). This was evident through indicators such as leaf chlorophyll content, photosynthetic intensity, total number of flowers per plant, effective flower ratio, number of fruits per plant, and average fruit weight. Different formulas of micronutrient foliar fertilizers resulted in varying yields, with F5 (Ac-Gaba-Cyto) producing the highest yield at 36.53 tons/ha, followed by F2 (Ev05 Humi pro) with 35.24 tons/ha. F3 and F4 (Hd 99 and Etda Zinc, respectively) also yielded higher than the control (31.57 tons/ha), though not as high as F5 and F2.*

Keywords: *Cherry tomato, micronutrient foliar fertilizers, yield.*

1. Introduction

Cherry tomato (*Lycopersicum esculentum* Miller.), a member of the Solanaceae family, produces round or elongated fruits that ripen into a uniform red color, with a distinctively sweet, crispy, and refreshing taste. The fruits are rich in pigments such as lycopene and carotene, highly nutritious, and contain carbohydrates and antioxidants like lycopene and vitamin C, which help reduce the risk of cardiovascular diseases [1], [2].

Additionally, cherry tomatoes are easy to cultivate, adaptable to various growing regions, and provide high economic value to farmers, serving as a significant source of income for many households. Thanks to these advantages, cherry tomatoes have become widely cultivated across the globe, including in Vietnam, and are a subject of interest for many researchers [3].

[1] Faculty of Agriculture Forestry and Fisheries, Hong Duc University; Email: levantrong@hdu.edu.vn
[2] Faculty of Natural Sciences, Hong Duc University
[3] Faculty of Education, Hong Duc University

Micronutrient foliar fertilizers are widely used in the market today due to their ability to promote plant growth, stimulate metabolism, and increase crop yields. To achieve high productivity, crops often require additional micronutrients [4], [5]. However, various types of micronutrient foliar fertilizers may exert different effects on plant development, leading to varying outcomes. Cherry tomatoes, in particular, are sensitive to such fertilization.

In Vietnam, the cultivation of cherry tomatoes in greenhouses and net houses is increasingly popular. The cherry tomato variety is widely adopted due to its high yield, superior quality, disease resistance, and suitability for protected cultivation. Cherry tomato productivity largely depends on cultivation conditions, with fertilizer application-especially foliar micronutrients-playing a crucial role throughout the plant's life cycle. Despite this, studies on the effects of micronutrient foliar fertilizers on cherry tomatoes remain limited. Therefore, this study is necessary to enhance the growth, development, and yield of cherry tomato crops [7].

2. Materials and methods

2.1. Research materials

Cherry tomato variety: Trang An cherry tomato (Product of Phu Dien Trading and Production)

Growing medium: A mixture of compost, coco peat, and burnt rice husk.

Decomposed cow manure (treated with antagonistic fungus Cotridma, net weight: 5 kg)

NPK fertilizer (16:16:8 + TE)

Micronutrient foliar fertilizers:

Ev05 Humi pro: Bo: 5000 mg/kg; moisture: 1%; contains Fe, Cu, amino acids, and other components.

Hd 99: Bo: 100,000 ppm; Cu: 400 ppm; Zn: 350 ppm; Fe: 350 ppm; Mn: 500 ppm; moisture: 1%; Mg: 2%.

Etda Zinc: Zn: 140,000 ppm; moisture: 1%.

Ac-Gaba-Cyto: Zn: 1600 ppm; Cu: 1600 ppm; Mn: 1500 ppm; Mn: 0.065%; GA3: 2100 ppm; Cytokinin: 1000 ppm; moisture: 5%.

2.2. Experimental conditions and duration

The experiment was conducted in a net house with rain shelter in Thanh Hoa from July to October 2024. The average temperature ranged from 27-35°C, and humidity from 60-75%, which are favorable conditions for cherry tomato growth.

2.3. Experimental design

The experiment was arranged with 5 formulas (each formula consisted of 10 pots, one plant per pot) using a Completely Randomized Design (CRD) with 3 replications [6], ensuring a plant density of 22,000 plants/ha across all formulas.

Substrate: Growing medium + NPK + cow manure.

Formula 1 (Control): Substrate + spray of water.

Formula 2: Substrate + foliar spray of Ev05 Humi pro.

Formula 3: Substrate + foliar spray of Hd 99.

Formula 4: Substrate + foliar spray of Etda Zinc.

Formula 5: Substrate + foliar spray of Ac-Gaba-Cyto.

The methods used for growing tomato seedlings were adapted from those described by Cuc T.T. (2002). Each pot (35 x 40 cm, with drainage holes) was filled with 5 kg of growing medium, supplemented with 1 kg of decomposed cow manure and 0.2 kg of NPK, mixed thoroughly. Seedlings 15-20 cm tall were transplanted, with approximately 50% of the stem buried to encourage adventitious root formation [7]. An additional 0.3 kg/pot of NPK was applied in two splits: 15-20 days after transplanting and at full flowering stage [7].

A support trellis system was established using 1.8 m-long stakes inserted 20 cm deep into the soil. Nylon ropes were tied horizontally for plant support, and the main stem was secured as it grew.

Micronutrient foliar fertilizers were applied as follows:

Ev05 Humi pro: 25 g/20-25 L of water; sprayed every 7-10 days at key stages (shoot emergence, flowering, fruit setting).

Hd 99: 5 g/30 L of water; sprayed every 7-10 days.

Etda Zinc: 5 g/20-25 L of water; sprayed every 7-10 days.

Ac-Gaba-Cyto: 5 g/20-25 L of water; 40-50 mL per plant per application.

Equivalent amounts of water were sprayed in the control formula. Plants were adequately irrigated to maintain proper moisture levels, avoiding waterlogging. Pests and diseases were monitored and controlled as needed, and old or infected leaves were pruned regularly to maintain plant health.

2.4. Observation of some physiological characteristics

Evaluation/ Assessment of Some Physiological Traits

The assessment of several physiological traits was conducted at key growth stages, as follows:

Seedling stage (30 days after sowing)

Recovery stage (40 days after sowing; >50% of plants recovered)

Flowering stage (55 days after sowing; >50% of plants flowering)

Harvesting stage (85 days after sowing; >50% of plants bearing mature fruit)

The assessment of chlorophyll content was carried out using the method described by Ma N.V. *et al.* (2013). Fesh leaves (2 g) are chopped into a porcelain mortar, crushed with a small amount of acetone 80% and puree, add acetone and filter through a funnel Buchner into the extraction vessel, we get a mixture of green pigments. Measure the filtrate on the spectrophotometer at the corresponding wavelengths. Chlorophyll content was calculated by the formula: Ca (mg/L) = 9.784 x E_{662} - 0.990 x E_{644}. Cb (mg/L) = 21.426 x E_{644} - 4.650 x E_{662}. Carotenoids content was calculated by the formula: Carotenoids(mg/L) = 4.695 x $E_{440.5}$ - 0.268 x $C_{(a+b).}$ Then the pigment content per 1g of fresh leaves is calculated [8].

Photosynthesis intensity: Measured using a CI-340 photosynthesis system (Model: CI-340. Manufacturer: CID - Mỹ).

Number of flowers and effective flower ratio: Number of flower clusters per main stem, number of flowers per cluster, and effective flower ratio (fruit-set flowers/total flowers).

2.5. Yield and Yield Components

Fruit number per plant: Total fruits per plant.

Average fruit weight: Measured with a digital scale (accuracy: 10^{-4} g).

Individual yield: Total fruit weight per plant until harvest completion.

2.6. Data Analysis

All experiments were conducted with three independent replicates. Results were expressed as mean ± standard deviation (SD). Data were statistically analyzed using ANOVA with IRRISTAT 5.0 software.

3. Results and Discussion

3.1. Effects of micronutrient foliar fertilizers on leaf chlorophyll content

Chlorophyll content in tomato leaves varied across growth stages and formulas (Table 1). During the seedling stage, differences were minimal as no foliar fertilizers had been applied yet. F5 consistently produced the highest chlorophyll content, particularly during the flowering stage (0.48 mg/g fresh leaf), followed by F2 and F4. The control (F1) had the lowest chlorophyll content across all stages.

Table 1. Effect of micronutrient foliar fertilizers on chlorophyll content

(mg/g fresh leaf)

Formula	**Seedling Stage** (30 DAS)	**Recovery Stage** (40 DAS)	**Flowering Stage** (55 DAS)	**Harvest Stage** (85 DAS)
F1	$0,21^{c} \pm 0,02$	$0,31^{c} \pm 0,02$	$0,37^{c} \pm 0,03$	$0,35^{c} \pm 0,02$
F2	$0,23^{b} \pm 0,01$	$0,34^{b} \pm 0,01$	$0,43^{b} \pm 0,01$	$0,41^{ab} \pm 0,01$
F3	$0,24^{a} \pm 0,01$	$0,32^{c} \pm 0,02$	$0,42^{b} \pm 0,02$	$0,39^{b} \pm 0,02$
F4	$0,23^{b} \pm 0,03$	$0,33^{b} \pm 0,03$	$0,41^{b} \pm 0,02$	$0,40^{b} \pm 0,03$
F5	$0,25^{a} \pm 0,01$	$0,37^{a} \pm 0,01$	$0,48^{a} \pm 0,01$	$0,42^{a} \pm 0,02$

Note: Within columns, means followed by the same letter are not significantly different at $p \leq 0.05$.

Data analysis in Table 1 shows that the chlorophyll content in cherry tomato leaves differed between growth stages and among formulas. At the seedling stage, due to the lack of micronutrient supplementation, chlorophyll content did not vary significantly among formulas, with the highest in F5 at 0.25 mg/g fresh leaf and the lowest in F1 at 0.21 mg/g fresh leaf. From recovery to flowering, due to the effects of different fertilizers, total chlorophyll content in the leaves changed significantly. F5 had higher chlorophyll levels compared to other formulas throughout the period from recovery to harvest. During recovery, F5 reached 0.37 mg/g fresh leaf, followed by F2 at 0.34 mg/g, F4 at 0.33 mg/g, and F1 at 0.31 mg/g. Chlorophyll content increased rapidly during the flowering stage, with F5 still highest at 0.48 mg/g fresh leaf, followed by F2 at 0.43 mg/g, and F1 lowest at 0.37 mg/g. At the beginning of harvest, F5 continued to have the highest chlorophyll content at 0.42 mg/g, followed by F2 at 0.41 mg/g.

The results across the experimental formulas show that the formulas supplemented with Ac-Gaba-Cyto and Ev05 Humi pro micronutrient foliar fertilizers had higher chlorophyll content in the leaves. Meanwhile, in formulas F3 and F4, where Etda Zinc or Hd 99 micronutrient foliar fertilizers were applied, the chlorophyll content also increased compared to the control. This indicates that foliar application of micronutrient foliar fertilizers generally enhances the total chlorophyll content in the leaves, but the effectiveness varies depending on the type of fertilizer used.

3.2. Effect of micronutrient foliar fertilizers on photosynthesis intensity

Photosynthesis intensity is closely linked to plant productivity, affected by light, leaf water content, chlorophyll concentration, and other physiological processes [9]. Table 2 shows that foliar fertilizers enhanced photosynthesis, with F5 achieving the highest values across all stages, followed by F2 and F4. The control (F1) consistently had the lowest rates.

Results of Table 2 show that at the seedling stage, before micronutrient supplementation, there was no significant difference in leaf photosynthetic intensity. The highest photosynthetic intensity was in F5 at 14.36 µmol/m²/s, and the lowest in F1 at 9.72 µmol/m²/s. From recovery to the beginning of harvest, photosynthetic intensity significantly differed among formulas. During recovery, F5 reached the highest value at 23.73 µmol/m²/s, followed by F2 at 21.22 µmol/m²/s, F4 at 21.15 µmol/m²/s, and F3 at 19.26 µmol/m²/s. At flowering, photosynthetic intensity increased across all formulas, with F5 highest at 26.81 µmol/m²/s, followed by F2 at 24.35 µmol/m²/s, and F1 lowest at 19.82 µmol/m²/s. At the start of harvest, photosynthetic intensity decreased, with F5 highest at 18.49 µmol/m²/s and F1 lowest at 17.31 µmol/m²/s.

Table 2. Effect on photosynthesis intensity (µmol/m²/s)

Formula	**Seedling Stage** (30 DAS)	**Recovery Stage** (40 DAS)	**Flowering Stage** (55 DAS)	**Harvest Stage** (85 DAS)
F1	$9,72^{b} \pm 0,06$	$18,82^{c} \pm 0,12$	$19,82^{c} \pm 0,15$	$17,31^{c} \pm 0,08$
F2	$11,56^{b} \pm 0,09$	$21,22^{b} \pm 0,14$	$24,35^{b} \pm 0,14$	$18,09^{b} \pm 0,14$
F3	$10,28^{b} \pm 0,04$	$19,26^{c} \pm 0,11$	$20,35^{c} \pm 0,08$	$18,36^{a} \pm 0,11$
F4	$14,24^{a} \pm 0,11$	$21,15^{b} \pm 0,16$	$23,17^{b} \pm 0,09$	$17,85^{b} \pm 0,07$
F5	$14,36^{a} \pm 0,06$	$23,73^{a} \pm 0,15$	$26,81^{a} \pm 0,15$	$18,49^{a} \pm 0,06$

Note: Within columns, means followed by the same letter are not significantly different at $p \leq 0.05$.

The research results on photosynthetic intensity across the experimental formulas show that in F5, with the supplementation of Ac-Gaba-Cyto micronutrient fertilizer, the photosynthetic intensity reached the highest value among all formulas. In formulas supplemented with Ev05 Humi pro, Hd 99, and Etda Zinc micronutrient foliar fertilizers, photosynthetic intensity also increased compared to the control, but remained lower than that of F5. These results indicate that the photosynthetic intensity of cherry tomato plants changes significantly with the supplementation of different micronutrient foliar fertilizers; however, the extent of the effect varies depending on the type of fertilizer applied. These results are consistent with the study by Nguyen *et al.* (2015), which found that fertilization increased the leaf area and photosynthetic rate of cherry tomatoes [10], and Akanksha *et al.* (2024) that foliar application of micronutrients enhanced the photosynthetic activities of cherry tomatoes [4].

3.3. Effect of micronutrient foliar fertilizers on number of flowers and effective flower ratio

Flower formation directly influences fruit set and is one of the key components determining yield [11]. Fertilizer application promotes flowering, increases flower number, and enhances the proportion of flowers that successfully set fruit [12]. Results are summarized in Table 3.

Results from Table 3 show that in F5, supplementation with Ac-Gaba-Cyto micronutrient fertilizer led to the highest average number of flower clusters per main stem (10.35 clusters) and the highest average number of flowers per cluster (16.24 flowers), resulting in the highest total number of flowers per plant at 168.35 with an effective flower rate of 79.21%. In F2, with Ev05 Humi pro supplementation, the average total flowers per plant were 156.14, with 15.41 flowers per cluster, 10.29 clusters per main stem, and an effective flower rate of 76.48%. The differences between F2 and F5 compared to other formulas were statistically significant. In F4, supplemented with Etda Zinc, the number of flowers per cluster was 14.54, with 10.21 clusters per stem, a total average of 143.19 flowers per plant, and an effective flower rate of 73.35%. In F3, supplemented with Hd 99, the number of flowers per cluster was 14.48, but the number of clusters was only 9.94, resulting in a lower total number of flowers (142.16) and an effective flower rate of 72.18%. Meanwhile, in F1 (control), the total number of flowers and clusters was the lowest, averaging 138.05 flowers per plant and an effective flower rate of only 69.45%.

Table 3. Effect of micronutrient foliar fertilizers on number of flowers and effective flower ratio

Formula	**Flowers/Cluster**	**Number of flower clusters/main stem** (Clusters)	**Total Flowers/Plant**	**Effective Flower Ratio** (%)
F1	$14{,}36^{b} \pm 0{,}24$	$9{,}67^{c} \pm 0{,}15$	$138{,}05^{c} \pm 1{,}18$	$69{,}45^{d} \pm 0{,}54$
F2	$15{,}41^{a} \pm 0{,}19$	$10{,}29^{a} \pm 0{,}08$	$156{,}14^{b} \pm 2{,}72$	$76{,}48^{b} \pm 0{,}45$

F3	14,48^{b} ± 0,27	9,94^{bc} ± 0,14	142,16^{c} ± 1,49	72,18^{c} ± 0,38
F4	14,54^{b} ± 0,32	10,21^{ab} ± 0,12	143,19^{c} ± 2,32	73,35^{c} ± 0,25
F5	16,24^{a} ± 0,15	10,35^{a} ± 0,17	168,35^{a} ± 1,25	79,21^{a} ± 0,61

Note: Within columns, means followed by the same letter are not significantly different at p ≤ 0.05.

Formula F5 (Ac-Gaba-Cyto) resulted in the highest average flower cluster number, total flowers, and effective flower ratio. F2 (Ev05 Humi pro) also significantly improved these parameters compared to the control. F3 and F4 showed moderate improvements. These results suggest that Ac-Gaba-Cyto and Ev05 Humi pro positively affect yield through increased flower numbers and higher flower-to-fruit conversion.

3.4. Effect of micronutrient foliar fertilizers on yield components and yield

Yield and its components are crucial indicators of the effectiveness of micronutrient foliar fertilizer application [13]. Results are presented in Table 4.

Table 4. Yield components and productivity

Formula	**Fruits/Plant**	**Avg. Fruit Weight** (g)	**Yield/Plant** (kg)	**Yield** (tons/ha)
F1	101,61^{d} ± 1,36	10,72^{c} ± 0,19	1,38^{d} ± 0,03	31,57^{c} ± 0,25
F2	117,23^{a} ± 1,27	11,87^{a} ± 0,12	1,58^{b} ± 0,05	35,24^{a} ± 0,41
F3	108,32^{c} ± 2,18	11,46^{b} ± 0,15	1,43^{c} ± 0,04	33,28^{b} ± 0,35
F4	112,59^{b} ± 2,34	11,52^{b} ± 0,22	1,46^{b} ± 0,03	33,91^{b} ± 0,22
F5	119,12^{a} ± 1,25	12,02^{a} ± 0,20	1,62^{a} ± 0,02	36,53^{a} ± 0,18

Note: Within columns, means followed by the same letter are not significantly different at p ≤ 0.05.

Results from Table 4 show that the number of fruits per plant significantly differed among formulas. F5 had the highest average number of fruits per plant at 119.12, followed by F2 at 117.23, F4 at 112.59, F3 at 108.32, and F1 at 101.61. These results indicate that foliar supplementation with Ac-Gaba-Cyto and Ev05 Humi pro increased the number of fruits per plant. Additionally, these fertilizers improved fruit set rate compared to the control. Supplementation with Etda Zinc or Hd 99 also increased fruit numbers but not as effectively as F2 and F5.

The average fruit weight also varied among formulas, with F5 having the highest fruit weight at 12.02g, followed by F2 at 11.87g, F4 at 11.52g, F3 at 11.46g, and the lowest in F1 at 10.72g. These differences were statistically significant. Thus, supplementation with Ac-Gaba-Cyto and Ev05 Humi pro increased fruit weight (above the overall average of 11.52g). Etda Zinc and Hd 99 also increased fruit weight compared to the control but were less effective than F2 and F5.

The results regarding fruit weight and fruit number closely correlated with individual plant yield and actual yield. F5 had the highest individual yield at 1.62 kg/plant, corresponding to 36.53 tons/ha, followed by F2 at 1.58 kg/plant (35.24 tons/ha), F4 at 1.46 kg/plant (33.91 tons/ha), and F3 at 1.43 kg/plant (33.28 tons/ha). The lowest yield was in F1 (control) at 1.38 kg/plant (31.57 tons/ha). All experimental formulas produced higher yields than the control, with statistically significant differences. Therefore, during the growth and development of cherry tomatoes, foliar supplementation with micronutrient foliar fertilizers can enhance individual and overall crop yields. These results are consistent with the study of Pramod *et al.* (2025) and Adams (2004) that foliar micronutrient fertilization significantly affected the growth parameters, yield and quality of cherry tomatoes. However, to maximize efficiency, it is necessary to appropriately apply different foliar micronutrients at different growth stages [5], [14].

4. Conclusions

The application of micronutrient foliar fertilizers significantly improved the growth and development of Trang An cherry tomato plants cultivated under rain-sheltered conditions, as evidenced by increased chlorophyll content, photosynthesis intensity, total number of flowers per plant, effective flower ratio, fruit number, and average fruit weight especially in formulas with Ac-Gaba-Cyto and Ev05 Humi pro.

The highest yield was recorded in Formula 5 (Ac-Gaba-Cyto) at 36.53 tons/ha, followed by F2 (Ev05 Humi pro) at 35.24 tons/ha. Formulas with Etda Zinc and Hd 99 also produced higher yields than the control (31.57 tons/ha), though not as high as those with Ac-Gaba-Cyto and Ev05 Humi pro. Therefore, during the growth and development of cherry tomato plants, the appropriate use of micronutrient foliar fertilizers is recommended to improve productivity and economic efficiency.

References

[1] Giovannucci E. (1999), *Tomatoes, tomato-based products, lycopene, and cancer: Review of the epidemiologic literature*, Journal of the National Cancer Institute, 91, 317-331.

[2] Iris E.P., David M.S. (2007), *History, origin and early cultivation of tomato (Solanaceae*), In: Razdan M., Mattoo A.K. Genetic Improvement of Solanaceous Crops, Vol. 2. Tomato. Science Publishers: New Hampshire, USA, pp. 1-24.

[3] Lam T.V., H H.D., Trinh T.T.T., Tuan H.Q, Bich T.T, Dan V.T. (2021), *Evaluation of General Combining Ability of S4 Cherry Tomato Lines and Growth of S5 Generation Lines*, Journal of Agriculture and Rural Development, 20(1): 17-23.

[4] Akanksha, Kaur A., Dhillon N.S., Verma L.K., Singh A.S. (2024), *Influence of Foliar Application of Micronutrients on Vegetative Growth of Cherry Tomato in Naturally Ventilated Polyhouse*, Plant Archives, 24(2), 1325-1330.

[5] Pramod B.S., Arwankie S., Mailappa A.S., Ajaykumara K.M.., Yogesh M. Teju C.M. (2025), *Influence of Micronutrients On Growth, Yield And Quality Of Cherry Tomato (Solanum Lycopersicum L. Var. Cerasiforme (Dunnal) A. Gray) Under Protected Condition*, Plant Archives, 25(1), 3209-3214.

[6] Hoang N.H (2017), *Experimental Methods and Biostatistics*, National Economics University Publishing House.

[7] Cuc T.T (2002), *Tomato Cultivation Techniques*, Agriculture Publishing House, Hanoi.

[8] Ma N.V., Hong L.V, Phong O.X. (2013), *Practical Methods in Plant Physiology*, Vietnam National University Publishing House, Hanoi.

[9] Khanh N.N., Bang C.P (2016), *Plant Physiology*, Education Publishing House.

[10] Nguyen T.N., Tang L.H., Peng Y.K., Ni J.Y., Chang Y.N. (2015), *Effects of Composite Inorganic, Organic Fertilizer and Foliar Spray of Multi-nutrients on Growth, Yield and Quality of Cherry Tomato,* J. Agr. Sci. Tech. 17: 1781-1788.

[11] Alburquerque N., Burgos L., Egea J. (2004), *Influence of flower bud density, flower bud drop and fruit set on apricot productivity*, Scientia Horticulturae, 102(4), 397-406.

[12] Nammidevi M., Shalini B., Bhongle S.A., Khiratkar S.D. (2008), *Effect of bio-inoculants with graded doses of NPK on flowering, yield attributes, and economics of annual chrysanthemum*, Journal of Soils and Crops, 18(1): 217-220.

[13] Hannan M.M., Biswas M.K., Ahmed M.B., Hossain M., Islam R. (2007), *Combining ability analysis of yield and yield components in tomato (Lycopersicum esculentum Mill.),* Turkish Journal of Botany, 31(6): 559-563.

[14] Adams P. (2004), *Effect of nutrition on tomato quality, tomatoes in peat. How feed variations affect yield*, Grower, 89(20): 1142-1145.