EFFECT OF SOME MICRONUTRIENTS AND COMMERCIAL FOLIFERTILIZERS ON TOMATO YIELD AND FRUIT QUALITY

By

S.A. Shafshak, I.M. Abd Alla, M.R. Gabal, T.A. Abed and Ali Adnan Gabal.

ABSTRACT

The effect of foliar application of 3 commercial folifertilizers (Bayfolan, Irral or Fetrilon-combi) and 5 different micronutrients (Fe, Zn, Mn, Cu or B) at different concentrations on yield and fruit quality of tomato were studied during 1982 and 1983 summer seasons. Number of fruits per plant, early marketable and total fruit yield were significantly increased by spraying tomato plants 3 times with 400 ppm Fe, 100 ppm B, 0.1% Bayfolan, 0.2% Irral or 0.6% Fetrilon-Combi in both seasons and 200 ppm Zn or 25 ppm Mn in one season only. These increments reached about 11-49% for early yield, 24-76% for marketable yield, 29-72% for total yield over than the control. The physical characteristics of tomato fruits (i.e. length, diameter and fruit shape index) were improved slightly by micronutrients application. Moreover, T.S.S., vitamin C, titratable acidity as well as reducing, non-reducing and total sugars contents were increased as a result of micro-nutrients foliar application. The highest vitamin-C content of tomato fruit was found when plants sprayed with 0.1% Bayfolan, however fruit acidity was considerably increased by B, Zn, Fe and Irral application at 100, 100, 400 ppm and 0.2% respectively. Furthermore, all treatments increased reduced and/or non reduced sugars content of tomato fruit compared with control in both seasons.

INTRODUCTION

Tomato is one of the most important vegetable crops grown in A.R.E., for local markets, processing and exportation. In the past faw years, great attention has been focussed on the possibility of using foliar application of some trace elements in order to improve both yield and quality of many vegetables.

The supply of micronutrients including Fe, Zn, Mn, Cu or B to vegetable crops became recently of a special importance after the construction of the High Dam which decreased the content of such elements in the water of River Nile. (Nabhan, 1966).

Application of some micronutrients was found to promote the productivity of tomato plants. Duffek (1972) on Mn, Ashour (1973) in Zn; Lukovnikova et al. (1975) on Cu; Mallick and Muthukrishana (1980) on Fe, Cu, or Zn and Amer (1981) on B, Zn or Mn, reported a favourable effect of micronutrients foliar application on tomato imit yield and its components.

Concerning the effect of the commercial folifertilizers on fmit yield and quality of tomato, Hodossi (1973); Hodossi and Hamar (1976) and Balasa et al. (1977) trials on different compound folifertilizers, Tanev and Stanchev (1978) on 0.2% Bayfolan and El-Sawah (1981) on 0.3% Wuxal, all reported a favourable response in this respect.

According to the effect of micronutrients and commercial folifertilizers application on tomato fruit length, fruit diame and fruit shape index, Govidan (1950) on B and Genchev and Gyu. (1975) on Zn, reported a favourable effect of micronutrients for iar application on fruit shape and size depending on the varie However, Woods and Nolan (1968) on Fe and Amer (1981) on B, Mn and Zn, mentioned that, spraying tomato plants with such micronutrients had no significant effect on either fruit length or

Regarding vitamin-C and titratable acidity content of toma fruit juice as affected by spraying plants with micronutrients, Verma et al. (1973) on B and Mallick and Muthukrishana (1980) c Fe, Zn, Mn or Cu found a promising response of such treatments this respect. Moreover, Balasa et al. (1977) found that, spray tomato plants with complex folifertilizers considerably increas vitamin-C content and titratable acidity of tomato fruit juice pared with the untreated ones. On the other hand, El-Sawah (19 did not find any significant differences in vitamin-C content of titratable acidity as a result of complete folifertilizer appl. cation.

Concerning total soluble solids (T.S.S.) and total sugars tent of tomato fruits, it were also increased as a result of spi ing tomato plants with micronutrients (Verma et al., 1973 on B Lukovnikova et al., 1975 on Cu, Mallick and Muthukrishana, 1980 Zn, Cu, Fe and Mn and Amer, 1981 on B, Zn or Mn). Moreover, usi commercial folifertilizers showed a positive response on these chemical constituents of tomato fruit (El-Sawah, 1981).

MATERIALS AND METHODS

This experiment was conducted at the Experimental Farm of the Faculty of Agriculture, Moshtohor, Zagazig University during the summer seasons of 1982 and 1983. Tomato seeds (Lycopersicon esculentum, Mill) cv. Strain-B were broadcasted in the nursery in February 7th 1982 and January 25th 1983. Uniform tomato seedling were removed and then transplanted in the permanent field in Man 29th and 21st in 1982 and 1983 respectively. Transplants were planted 30 cm apart on one side of ridges 100 cm width. All tre ments and control were fertilized with 99 kg N, 64 kg P205 and 8 kg K₂O per feddan. Fertilizers were applied as ammonium sulphate (33% N), Calcium superphosphate (16% P₂O₅) and potassium sulphate (48% K₂O) at four, two and three applications of N, P and K fert lizers respectively. Time of fertilizers addition was at 21 days after transplanting and at 21 days intervals. The plot area was about 12 m2. The complete randomized block design with four rel cates was followed in both seasons.

```
The 1982 experiment included 15 treatments as follows:
```

^{1.} Bayfolan at 0.1% 4. Irral at 0.1% 7. Fetrilon-combi at 0.2% 5. " 0.2% 8. " " 0.3% 8. " " 0.4% 9. "

^{10.} Fe at 400 ppm. 11. Zn at 100 ppm 13. Cu at 200 ppm 14. B at 100 ppm 12. Mn at 50 ppm

^{15.} The control treatment (sprayed with distillated water).

In 1983, extra five treatments of single micronutrient were also examined. They were, Fe at 800 ppm, Mn at 25 ppm, B at 200 ppm, Zn at 200 ppm or Cu at 100 ppm.

The chemical composition of the commercial folifertilizers are given in the following table.

Essential elements	Bayfolan	Irral (verde)	Fetrilon-combi
N%	11.0000	20.00	
P%	8.0000	8.00	-
. K&	6.0000	16.00	
Mg %		1.00	4.0
Fe%	0.0185	0.03	1.0
Zn%	0.0060	0.10	0.5
Mn%	0.0160	1.00	1.5
B%	0.0113	0.50	0.3
Mo%	0.00095		
Cu%	0.0080	0.10	0.5
Co%	0.0004		

Tomato plants were sprayed three times, 2, 5 and 7 weeks after transplanting, with an aqueous solutions of Bayfolan, Irral, Fetrilon-combi, FeSO₄.7($\rm H_2O$), ZnSO₄.7($\rm H_2O$), MnSO₄. $\rm H_2O$, CuSO₄.5($\rm H_2O$) or NaBO₇.10($\rm H_2O$) at the previously mentioned doses.

The experiment procedures were as follows:

1. Fruit yield and its components:

All harvested fruits from each experimental plot were used for determining the following data:

- Average fruit weight (gm). a) Number of fruits per plant. b)
- Fruit yield per plant (kg). Early yield; calculated as the fruit yield of the first c) d) three pickings (ton/feddan).
- Total yield (ton/feddan). f) Marketable yield (ton/feddan).

2. Fruit quality:

At each picking time a representative sample of 15-20 fruits of each experimental plot was taken for determining the following characteristics:

a. Physical characteristics:

- 1. Fruit length (cm).
- Fruit diameter (cm).
 Fruit shape index (L/D).

b. Chemical constituent:

1. Both of vitamin-C and titratable acidity fruit content were determined as mg/100 cm³ juice, as the methods described in A.O.A.C. (1970).

- Total soluble solids; It was determined in tomato sap using hand refractometer.
- 3. Reducing, non-reducing and total sugars; were determined colorimetrically by using the method described by Michel et al. (1956) and calculated as g sugar/100 g based on dry weight.

RESULTS AND DISCUSSION

1. Fruit yield and its components:

Data illustrated in Tables (1 and 2) clearly show that most of micronutrients or commercial folifertilizers treatments incressed number of fruits per plant as well as early, marketable and total yield than the control.

However, average fruit weight was increased only as a result of spraying plants with 0.1% Irral or 0.4% Bayfolan in both seasons and 800 ppm Fe or 100 ppm Cu in the second season only. The favourable effect of micronutrients application on fruit weight have been reported by Genehev and Gyrov (1975) and Amer (1981) on tomato.

The most effective treatments on number of fruits per plant were; 400 ppm Fe, Fetrilon-Combi 0.6% or 100 ppm B in both season and 200 ppm Zn, 25 ppm Mn in the second season only. This result may be referred to the enhancing effect of micronutrients application on number of flowers per plant and fruit setting percentage obtained results are in confirmity with those of Amer (1981) and El-Sawah (1981).

Concerning fruit yield as kg/plant or ton/feddan results showed that spraying plants with either 100 ppm B, 400 ppm Fe, 0.1% Bayfolan, 0.2% Irral or 0.6% Fetrilon-combi were the most effective treatments which significantly increased total yield about 29-54% than the control in both seasons. In 1983, only the best treatments were 200 ppm Zn or 25 ppm Mn which increased total yield 20 or 72% than the control, respectively. This favourable effect of micronutrients application on fruit yield could be referred mainly to the increase in number of fruit produced per plant as shown in Tables 1 and 2. Obtained results here are in harmony withose of Verma et al. (1973); Duffek (1975), Mallick and Muthukrishana (1980) and Amer (1981) on treating tomato with single micronutrient and Hodossi (1973), Hodossi and Hamar (1976), Bala et al. (1977) on spraying tomato plants with different commercial folifertilizers.

Referring to the effect of micronutrients or commercial fol fertilizers on early and marketable yield, data showed the same trend previously mentioned for total yield. It means that, not only the quantity but also the quality and earliness of tomato fruit yield were significantly increased by the foliar application of such treatments. These increments ranged from 11-49% for earlyield and 24-76% for marketable yield by using Bayfolan 0.1 or I Irral 0.2%, Fetrilon-combi 0.6%, 400 ppm Fe, 100 ppm B for both seasons; and 25 ppm Mn or 200 ppm Zn for the second season only.

Treatments	ts.	L.	0	0 0	OT	Marketable	Early
Fertilizer	Concen- tration	D TH	plant plant	(kg)		4 0	/uo
Bavfolan	0.1%	99	24.95	1,636	16,360	15,340	6.715
	8 %	99	20,48	1.342	1,3,420	12.855	6.240
3	8 4.0		18,55	1,255	12,550	11.920	. 6.370
- c	0.1%	71	19,25	1,377	13,770	13,010	6,515
	8.0		26,33	1.637	16.370	15,645	7,603
	0.4%		21,55	1,385	13,850	13,150	7,165
Ferrilon combi			21,50	1.387	13,870	13,198	7,065
	100		22,30	1,460	14,600	13,568	7,215
	0.0			1.689	16,890	16,290	7,678
g u	0		27.68	1,793	17.930	16.695	8,108
20	. 0	61	25.63	1,574	15.740	14.793	6,715
i S	50	59.	21,63	1,278	12,780	11.678	6.445
	0			1,621	16.210	15,240	6,700
3 0	0	67	25 : 85	1.724	17.240	16,085	7,895
Control			0	1,305	13,050		5,720
			1 4 4	1 1 1 0 0	1111111	000000000000000000000000000000000000000	10

tery and its components of tomato as affected by foliar application of some icronutrients and commercial folifertilizers during summer season of 1983.	Marketable Early yield yield
0.00	
n m	271
00	77
O.	1 03
	E - D
11_	1111 -1
- 0	m >1
1 -	-
	1
E 10	10
0 01	33
0 10	60
H 10	Marketa
7 (0)	00
0_	~~
	1 - 0
(0 W	0 77
-	2 1
	1
(0)	1
CI (1)	
7	
0 0	1
No.	0 1
771	10.7
2 -	Total
7	107
0.	1 - >
U	
m m	
J 5	1
0 0	1
DN	1
- 44	0 4.
	rield/ plant
in .L.	0 00-
44	7 7
0) -	- LL
(O (D)	1
0 1	
0 17	1
	1 11 10
0 0	01
= -	0 1
	107
43	7 1
2 (1	12-
9 0	No. of fruits
0 0	1
	(1)
	0
0 0	0 4
- 0	LH
2	0 7
0.71	150
= -	Average No. of fruit fruits
70 0	
0	1
(D	
00 to	
- C	
4 D	
4	
J L	S
C 44	0
C 0	
-	0
0 0	00 0
1 6	4
DO	C .
4 44	l w
- E	E
***	1
	. 10
1	(1)
4	1
	H
4	
שו	The same of
4	1
To	
-1	1

Treatmen	ts	6 7	0	iel	ota	Bris	7
Fertilizer	concen- tration	fruit weight(g)	fruits/ plant	plant (kg)	yield Ton/fed.	yield Ton/fed.	yield Ton/fed
Bayfolan	0.1%		10	.64	5.43	0.9	4
•	8.0	64	22.8	1.455	14.550	4	5,065
	0.4%		M	.46	4.62	4.5	.37
Irral	0.1%		M	.51	5,10	4.6	34
	%		1	.77	7.71	7.0	.47
	0.4%		ä	2	2,18	1.7	15
Ferrilon-combi	0.15%		9	4	1.25	1.0	.73
	0.3%		0	. 25	2.55	2,3	9
	0.6%		8	62	6.21	6.0	. 53
Fe	0 0		0	. 81	8.18	7.7	. 55
•	o pp		0	.27	2.72	2.5	. 43
Zn	O. pp		-	.34	3,46	3	.67
	dd o		M	.07	0.74	4.0	.36
Mn	S pp		a	.98	9,89	9.6	.43
	od o		8	.07	0.79	7.0	23
Cu	dd o		7.	. 70	7.09	6.7	.43
**************************************	00 0		8	60	86.0	6.0	. 24
Œ	100 ppm		6	. 85	8,53	8	. 59
	0 0		3	. 34	3,46	2.9	. 81
Control			0	. 20	2,05	1.6	95
1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 0 1 0	1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1	

2. Tomato fruit quality:

2.a. Physical characteristics of tomato fruits:

Data presented in Table (3) clearly show that foliar application of Irral (0.1-0.4%), Bayfolan (0.1-0.4%), Fetrilon-combi (0.15-0.6%), 400 ppm Fe or 100 ppm B, significantly increased fruit length and fruit diameter which slightly affected fruit shape index compared with control treatment at both summer seasons of 1982 and 1983. Anyhow, fruit shape index ranged from 0.9-1.2 however variances were only significant in 1983 season. Moreover, the application of 200 ppm Zn, 25 ppm Mn or 100 ppm Cu significantly increased fruit length and diameter only in the second season of 1983.

These results are in harmony with those reported by Lukovni-kova et al. (1975) on Cu and Mallick and Muthukrishana (1980) on Zn, Cu, Fe or Mn. However, Woods and Nolan (1968) on Fe, and Amer (1981) on B, Mn or Zn, mentioned that spraying tomato plants with such treatments had no significant effect on either fruit length or fruit diameter.

2.b. Chemical constituent of tomato fruits:

It is clearly evident, from Tables (4 and 5) that foliar application of many micronutrients and commercial folifertilizers significantly increased vitamin-C, titratable acidity, total soluble solids as well as reducing, non-reducing and total sugars content of tomato fruit than that of the control.

In this respect, the highest vitamin-C content was in fruits of plants treated with Bayfolan 0.1% in both seasons or 100 ppm B or 200 ppm Zn in the second season. Fruit acidity was greatly increased by 100 ppm B, 100 ppm Zn, 400 ppm Fe, or Irral 0.2% compared with other treatments.

T.S.S. % was considerably increased by the application of 100 or 200 ppm B and 400 ppm Fe compared with other treatments, however variances was significant only in the second season. This result may reflex the role of boron on sugar assimilation (Govidan, 1950). Concerning total sugars content of tomato fruit it was significantly increased by all treatments of micronutrients application than the control. The high sugars assimilation in treated plants compared with the untreated ones may be referred to the high chlorophyll content in leaves.

Regarding the effect of micronutrients on vitamin C and titratable acidity content of tomato fruits, similar results were reported by Verma et al. (1973) on B, and Mallick and Muthukrishana (1980) on Fe, Zn, Mn or Cu.

Concerning the effect of commercial folifertilizers on vitamin C and titratable acidity content of tomato fruits, obtained results confirm with those of Balasa et al. (1977).

The obtained results concerned with total soluble solids and total sugars content of tomato fruits are also in accordance with those of Verma et al (1973), Lukovnikova et al. (1975), Mallick and Muthukrishana (1980) and Amer (1981) who revealed that, foliar sprays of such micronutrients increased both total solible solids and total sugars content of tomato fruits.

		Į
C		ł
0		1
- applicati		1
		1
200		1
C		4
13		1
-		1
-		1
-		1
0		J
0		1
-		1
(0)		1
		1
No.		
a		
-4		
0		
0		
4-		
-		
2		
11		
73	(1)	
red .		
0)	-	
And	D -	
()	N	
713	4	
4	-	
1-from	-	
4-		
ruits as affected by foliar app	olifertiliza	
-0	T	
1600		
(1.7	O)	
CO	4-	
	ref	
100	H	
02		
44	0	
-	Marin .	
7		
	-	
han		
4	ммегста	
	·cl	
0	()	
	er	
- dead	-	
G	0	
E	E	
0	pie	
	0	
of tomato fruits	commercial foli	
	0	
4-		
0	U	
	pros	
	None .	
144		
(C)	44	
CS		
ics	s and c	
ics	0	
tics	13	
stics	nts	
istics	ents	
istics.	Lents	
ristics	tents (
eristics	rients	
teristics	trients (
cteristics	utrients	
acteristics	nutrients	
racteristics	onutrients a	
racteristics	onutrients a	
aracteristics	ronutrients	
haracteristics	cronutrients	
characteristics	cronutrients	
characteristics o	cronutrients	
. characteristics	cronutrients	
_	ome micronutrients	
vsical characteristics	cronutrients	
_	ome micronutrients	

Treatmen	1.5	Se	U		Se	ason	1 1 1
Fertilizer	Concen- tration	1	Fruit diamete (cm)	Fruit index (L/D)	ruit ength (cm).	diam (cm	Fruit index (L/D)
Bayfolan			5.7	0.1	900	5.8	01.
1							
Irral	2,7%	10 H	C to				
	*						
Fetrilon-combi	0.15%					-	
=	0.3%						
	36				*		
9 14	od o						
	900	4		1			
Zn Zn		*		- 1			
	200	1		- 1			
- U	10					*	
	200	. 1	- 1	1			
7.	100						
Q	100 ppm		5.2			*	
	00 0	1	1 1	F			*
Control	L		4.8				0.0
1 (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1 1 1	ŧ	

2.98 Sugars suga	Concent tration able T.S.S. sugars reducing sugars acidity (%) acidity	Concentration Concen	0 1 4 0		educ	-100	Total	
combi Concent cm juice mg/loo. Tration cm juice mg/loo. 1,0,2% 3771 655 5.1 3.9 1.6 5.2 0.2% 3.7 1.6 5.5 0.1% 3.4 5.0 0.1% 3.4 5.0 0.1% 3.4 5.0 0.1% 3.4 5.0 0.1% 3.7 0.1% 3	Concentration mg/loo. relation cm_juice mg/loo. relation cm_juice mg/loo. combi 0.2% 37.1 655 5.1 3.9 1.6 5.5 5.0 0.4% 37.1 659 5.0 3.7 1.6 5.5 5.0 0.4% 37.1 659 5.0 3.7 1.6 5.3 1.0 0.2% 37.1 650 5.0 3.4 0.9 4.0 0.9 4.3 1.0 0.9 pm 35.0 695 5.1 3.2 0.6 4.9 3.1 1.7 5.8 4.0 0.6% 37.1 690 5.1 3.2 1.3 5.2 1.3 5.1 1.3 5.2 5.0 ppm 32.5 6.0 695 5.1 3.2 1.3 5.1 1.3 5.2 5.0 ppm 32.5 6.0 695 5.1 3.0 1.5 5.2 5.0 ppm 32.5 701 5.1 3.0 1.5 5.2 3.9 1.5 5.2 5.0 ppm 32.5 701 5.1 3.0 0.6 3.6 5.2 5.0 ppm 32.5 701 5.1 3.0 0.6 3.6 5.2 5.0 ppm 32.5 701 5.1 7.5 701 5.1 7.5 5.2 5.2 5.0 ppm 32.5 701 5.1 7.5 701 7.0 1.0 0.1 0.1 0.1 0.1 0.1	Concentration Concentration 0.1% 0.2% 0.4% 0.4% 0.1% 0.2% 37. 0.4% 0.1% 37. 0.6% 100 ppm 36. 100 ppm 37. 200 ppm 37. 200 ppm 37. 38. 100 ppm 37. 50 ppm 38.	acidi	0.98		educ	0 1	
0.1% 39.5 695 5.2 4:1 1.7 5.8 0.1% 37.1 665 5.2 3.9 1.6 650 0.1% 3.7 1.6 650 5.0 3.2 0.7 3.9 0.1% 37.1 665 5.0 3.2 0.0 0.1 3.2 0.0 0.1 3.2 0.0 0.1 3.2 0.0 0.1 3.2 0.0 0.1 3.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.1% 39.5 695 5.2 4:1 1.7 5.8 0.2% 37.1 659 5.0 3.7 1.6 590 0.2% 37.1 659 5.0 3.7 1.6 59.3 0.1% 37.1 659 5.0 3.7 1.6 59.3 0.1% 37.9 697 5.0 3.4 0.8 4.0 0.15% 35.6 656 4.9 3.6 1.6 5.0 3.7 0.08 4.0 0.15% 37.1 690 5.1 3.6 1.6 5.2 0.9 4.0 0.8 4.0 0.15% 37.1 690 5.1 3.6 1.6 5.1 1.3 5.2 0.09 pm 37.6 692 5.1 4.2 1.3 5.2 0.00 pm 37.6 694 5.2 3.9 1.3 5.4 0.0 ppm 37.6 694 5.2 3.9 1.4 5.4 5.2 0.00 pm 37.6 682 5.0 3.9 1.4 5.4 5.2 2.5 682 5.0 3.8 1.5 5.2 2.5 682 5.0 3.8 1.5 5.2 2.5 5.0 0.1 0.1 0.1 0.1	0.1% 339. 0.2% 377. 0.4% 347. 0.1% 36. 0.1% 36. 0.1% 36. 0.1% 36. 0.06% 36. 0.06% 36. 100 ppm 34. 100 ppm 37. 200 ppm 37. 100 ppm 37.	ice mg/100' cm ³ juic		6	00 g dr	eigh	E
0.1% 37.1 655 5.2 4.1 1.6 690 697 5.1 3.9 1.6 650 697 6.0 3.2 4.1 1.6 650 697 6.0 3.2 0.0 3.2 0.0 5.2 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.0 0.3 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.2 0.0 5.1 3.3 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4	0.1% 39.5 695 5.2 4:1 1.6 650 6.1% 3.7.1 650 5.1 3.7 0.2% 37.1 650 5.0 3.2 0.2% 37.1 650 5.0 3.2 0.2% 37.1 650 5.0 3.2 0.0 0.2 0.2% 37.1 650 5.0 3.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.1% 0.2% 0.4% 0.1% 0.1% 0.1% 0.15% 0.3% 0.3% 0.5% 0.06% 100 ppm 100 p	-			1		Ef
0.1% 37.1 655 5.1 3.7 0.9 4.0 0.1% 37.9 0.1% 37.9 659 5.0 0.1% 37.9 6697 5.1 3.2 0.0 0.9 4.0 0.1% 37.9 6697 5.1 3.2 0.0 0.9 4.0 0.1% 37.1 6696 5.0 3.6 0.9 4.0 0.9 3.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.2% 37.1 6575 5.1 3.7 1.6 5.3 5.0 0.7 4% 3.7.1 659 5.0 3.2 0.7 3.2 0.7 5.1 0.2% 37.9 659 5.0 3.2 0.0 3.2 0.0 5.0 0.3% 37.1 659 5.0 3.2 0.0 5.0 0.3% 37.1 659 655 4.9 3.1 1.3 5.2 1.6 690 5.1 3.2 1.6 690 5.1 3.2 1.5 5.2 0.0 ppm 32.5 692 4.2 3.9 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1	0.2% 37. 0.1% 34. 0.1% 34. 0.15% 36. 0.3% 36. 100 ppm 37. 50 ppm 37. 100 ppm 37. 100 ppm 37.	69					ec
0.1% 37.1 659 5.0 0.7 3.2 0.7 3.9 0.1% 37.9 660 5.0 0.3% 37.1 660 5.0 0.3% 37.1 660 5.0 0.3% 37.1 690 697 5.0 0.3% 37.1 690 697 5.0 0.3% 37.1 690 692 4.9 3.6 1.3 8.1 1.3 8.2 0.0 ppm 37.6 692 4.2 3.9 1.3 8.9 1.3 8.2 0.0 ppm 32.2 682 5.0 8.1 0.0 ppm 32.2 682 5.0 0.1 3.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.1% 37.1 659 5.0 3.2 0.7 3.9 0.1% 34.5 660 5.0 3.2 0.7 3.9 0.1% 35.0 0.3% 35.1 659 697 5.0 3.2 0.9 4.3 4.3 0.15% 35.1 690 5.0 3.2 0.9 4.3 4.9 0.15% 35.1 690 5.1 3.2 0.9 ppm 35.0 695 5.1 3.2 1.5 5.0 ppm 37.6 694 5.2 3.9 1.3 5.2 1.3 5.1 1.3 5.2 1.0 ppm 35.0 632 5.1 3.9 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.1 1.3 5.2 1.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5	27. 0.1% 0.1% 0.1% 0.15% 0.3% 400 ppm 100 ppm 50 ppm 350 100 ppm 37. 360 100 ppm 37. 360 100 ppm 37. 380 37. 380 37. 380 380 380 380 380 380 380 380 380 380	67		-			t
2.6 8.1 n.s 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.1% 34.5 660 5.0 3.4 0.9 4.3 0.2% 35.6 697 5.1 3.2 0.8 4.0 0.8 3.2 0.15% 35.6 695 4.9 3.1 3.2 0.8 4.0 0.8 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 4.0 0.9 692 4.2 4.2 4.1 1.3 5.2 6.0 ppm 32.5 682 5.0 4.0 1.3 5.0 0.6 32.0 632 4.9 3.0 0.6 3.6 3.6 1.0 ppm 32.2 682 5.0 4.9 3.0 0.6 3.6 3.6 1.0 ppm 32.2 683 6.1 0.1 0.1 0.1 0.1	24. 0.1% 0.2% 0.1% 0.15% 0.3% 400 ppm 100 ppm 30 100 ppm 30 100 ppm 32 32 32 32 32 33 34	65		-			0
20. 2% 37.9 697 5.1 3.4 0.8 4.0 0.15% 36.6 697 5.1 3.2 0.8 4.0 0.3% 36.6 695 4.9 3.1 1.3 3.6 1	27.9 697 5.1 3.4 0.8 4.0 0.15% 35.6 656 4.9 3.6 1.6 5.0 0.3% 35.1 0.3% 35.1 0.3% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.1 0.9% 35.2	0.2% 0.15% 0.15% 0.3% 0.3% 0.5% 0.5% 0.5% 0.5% 0.5% 0.5% 0.5% 0.5	99		-			É
20.0 ppm 32.5 682 697 5.0 3.2 0.8 5.0 3.2 0.8 5.0 0.3% 37.1 695 5.1 4.9 3.0 1.3 5.7 5.0 0.5% 37.1 690 5.1 4.9 3.2 1.5 5.7 5.0 ppm 37.6 694 5.2 3.9 1.3 5.2 5.4 4.7 5.0 ppm 32.5 694 5.2 3.9 1.3 5.2 5.4 5.0 ppm 32.5 682 5.0 4.0 1.4 5.3 5.4 5.0 ppm 32.2 682 5.0 4.0 1.4 5.3 5.4 5.4 5.1 5.0 ppm 32.2 682 682 69.0 0.6 5.1 0.1 0.1 0.1 0.1 0.1	2.6 636 636 4.9 3.2 0.8 5.2 0.8 3.5 0.8 3.5 0.8 3.5 0.8 3.5 0.8 3.5 0.8 3.5 0.8 3.1 0.8 3.1 0.8 3.1 0.8 3.1 0.8 3.2 0.8 3.1 0.8 3.2 0.8 3.1 0.8 3.2 0.8 3.1 0.8 3.2 0.	0.15% 35.00.05% 35.00.05% 35.00.05% 35.00.05% 35.00.000 35.00.000 35.00.000 35.00.000 35.00.000 35.0	69	- 6	- 70	-		S
0.15% 35.6 656 4.9 3.6 1.6 5.6 6.56 4.9 3.1 1.3 4.9 5.1 4.9 5.1 3.0 0.5% 37.1 6.90 5.1 3.2 1.3 5.4 4.7 4.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.15% 35.6 656 4.9 3.6 1.6 5.7 0.15% 35.0 0.15% 35.6 675 4.9 3.1 1.3 5.7 0.5% 37.1 690 5.1 3.2 1.3 5.7 0.5% 37.1 690 5.1 3.2 1.3 5.7 0.0 ppm 32.5 694 5.0 4.0 1.5 5.2 200 ppm 32.5 701 5.1 3.0 0.6 3.6 3.6 1.5 5.1 2.6 8.1 0.1 0.1 0.1 0.1	0.15% 35.00.3% 37.00.5% 37.00.5% 37.00.5% 37.00.00.00.00.00.00.00.00.00.00.00.00.00	809		-	-		on
0.15% 35.6 675 4.9 3.1 1.3 4.4 4.0 0.3% 37.1 696 5.1 3.2 1.5 4.0 4.7 4.0 ppm 34.6 694 5.2 3.9 1.3 5.2 5.0 ppm 32.5 701 5.1 3.0 0.6 32.2 632 4.0 0.6 3.6 0.6 3.0 0.6 3.6 0.1 0.1 0.1 0.1	0.15% 37.1 695 4.9 3.1 1.3 4.4 0.3% 37.1 696 5.1 3.2 1.7 5.7 100 ppm 34.6 694 4.2 4.2 4.1 1.3 5.2 200 ppm 37.6 682 5.0 4.0 1.3 5.2 1.0 ppm 32.5 701 5.1 3.0 0.6 3.5 2.2 2.6 8.1 0.8 0.1 0.1 0.1	0.15% 35. 0.3% 37. 0.6% 400 ppm 35. 100 ppm 37. 200 ppm 32. 100 ppm 32.) (ie
0.3% 37:1 675 4:9 0.6% 357:1 690 5:1 4:0 1.0 ppm 34.6 694 5:2 3:9 1.3 5:2 100 ppm 32.5 701 5:1 3:8 1.5 5:3 100 ppm 32.2 632 4:9 3:0 0.6 2.6 8.1 0.8 0.1 0.1	0.3% 37:1 675 4:2 4:0 1:7 5:7 4:7 696 5:1 3:2 1:5 5:4 4:7 696 5:1 3:2 1:3 5:4 5:7 5:0 ppm 37.6 694 5:0 3:9 1:3 5:2 5:0 ppm 32.5 701 5:1 3:0 0.6 3:0 1.4 5:3 5:0 2:0 ppm 32.2 632 4:9 3:0 0.6 3:6 3:6 5:0 2:6 8:1 0.8 0.1 0.1 0.1	0.3% 0.6% 400 ppm 100 ppm 37 50 ppm 37 100 ppm 32 100 ppm 32 32	00		b .			N
0.6% 37.1 690 5.1 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2	0.5% 37.1 690 5.1 4.2 4.7 4.7 4.7 1.5 5.4 4.0 ppm 35.0 695 5.1 3.2 1.3 5.2 2.0 ppm 37.6 694 5.2 3.9 1.3 5.2 2.0 ppm 32.5 701 5.1 3.0 1.4 5.3 5.4 5.0 ppm 32.2 632 4.9 3.0 0.6 3.6 5.3 5.6 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8	0.5% 400 ppm 100 ppm 50 ppm 37 200 ppm 37 100 ppm 32 100 ppm 32 35	67					lu
100 ppm 35.0 696 5.1 3.2 1.3 5.4 1.0 ppm 37.6 692 4.2 4.1 1.3 5.2 1.0 ppm 32.5 682 5.0 3.8 1.5 5.3 1.0 ppm 32.2 632 4.9 3.0 0.6 5.3 3.6 2.5 8.1 0.1 0.1 0.1 0.1	200 ppm 35.0 696 5.1 4.2 4.1 1.3 5.4 5.0 ppm 37.6 692 4.2 3.9 1.3 5.2 1.0 ppm 32.5 701 5.1 3.0 1.0 ppm 32.2 632 4.9 3.0 0.6 3.6 5.8 5.8 5.8 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	100 ppm 35. 100 ppm 37. 200 ppm 37. 200 ppm 32. 100 ppm 32.	9		6	4		t
100 ppm 34.6 694 4.2 4.1 1.3 5.2 5.0 ppm 32.5 682 5.0 4.0 1.4 5.2 5.0 ppm 32.5 5.0 4.0 1.4 5.3 1.0 ppm 32.2 632 4.9 3.0 0.6 3.6 5.3 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	100 ppm 34.6 692 4.2 4.1 1.3 5.2 5.0 ppm 37.6 694 5.2 3.9 1.3 5.2 5.0 ppm 32.5 701 5.1 3.0 0.6 5.3 3.6 5.0 5.8 5.0 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.4 5.3 5.6 5.3 5.0 5.3 5.0 5.3 5.6 5.3 5.0 5.8 5.0 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8	100 ppm 34. 200 ppm 32. 200 pp	69					ri
100 ppm 37:6 694 5:2 3.9 1.3 5:4 20 ppm 32:5 682 5:0 4.0 1.4 5:4 5:4 100 ppm 35:0 632 4:9 3.0 0.6 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4	100 ppm 37.6 694 5.2 3.9 1.3 5.4 2.0 ppm 32.5 701 5.1 3.8 1.5 5.3 3.6 2.0 ppm 35.2 632 4.9 3.0 0.6 5.3 3.6 2.6 8.1 n.s 0.1 0.1 0.1	100 ppm 37. 200 ppm 32. 35. 100 ppm 32. 35. 35. 35. 35. 35. 35. 35. 35. 35. 35	80		-			e)
200 ppm 32.5 682 5.0 4.0 1.4 5.4 5.4 10 ppm 32.5 682 5.0 3.8 1.5 3.0 0.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3	200 ppm 32.5 5.0 4.0 1.4 5.4 1.5 1.0 ppm 32.5 701 5.1 3.8 1.5 5.3 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3	200 ppm 325. 100 ppm 335.	9	, ,		- *		nt
200 ppm 32.5 701 5.1 3.8 1.5 5.3 100 ppm 32.2 632 4.9 3.0 0.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3	200 ppm 32.5 701 5.1 3.8 1.5 5.1 3.8 1.5 5.1 3.0 0.6 3.2 4.9 3.0 0.6 3.0 0.6 3.0 0.6 3.0 0.6 3.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0	200 ppm 35. 100 ppm 35.						S
100 ppm 35.0 701 5.1 3.0 0.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3	100 ppm 35.0 701 5.1 3.0 0.6 3.2 3.0 0.6 3.2 3.0 0.6 3.2 3.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0	35. 32. 32. 32. 32. 32. 32. 33. 33.	9					
5% 22.2 632 4.9 3.0 0.1 0.1 0.1 0.1 0.1	32.2 632 4.9 3.0 0.1 0.1 0.1 0.1 0.1	N N N N N N N N N N N N N N N N N N N	20	7				
5% 2.6 8.1 n.s 0.1 0.1	5% 2.6 8.1 n.s 0.1 0.1 0.1	82	9	-	-			
5% 8.1 n.s 0.1 0.1	2.6 8.1 n.s 0.1 0.1 0.1	2%				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
	e de la companya de l	%n	00 11					
863				- 1				
863								
863								
863								
	\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$\$P\$							86
								3

folan	g/loo able	7.8.8.	Reducing	Non- reducing sugars	Total
yfolan 0.1% 37.9 68 67 67.9 68 67 68 67 68 68 68 68 68 68 68 68 68 68 68 68 68	m juice mg/100' cm ³ juic	(8)	9/10	10	ight
ral 0.2% 33.6 66 66 67 9.1% 32.7 66 66 66 67 9.1% 32.7 73.5 66 66 67 9.1% 32.9 66 68 880 69 69 68 83.3 5 68 880 69 69 68 83.3 5 68 880 69 69 69 69 69 69 69 69 69 69 69 69 69	7.9	1			1
ral 0.4% 35.0 666 122.7 73 35.0 666 122.0 0.2% 35.1 73 73 120 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 668 122.9 73 73 122.9 73 73 122.9 73 122.9 73 122.9 73 122.9 73 122.9 73 122.9 73 122.9 73 122.0 659 122.9 73 122.9 73 122.9 73 122.9 669 122.9 73 122.9 669 122.9 73 122.9 669 122.9 73 122.9 669 123.9 73 122.9 669 123.9 73 122.9 669 123.9 73 123.9 73 123.9 669 123.9 73 1	3.6 67		4.7	1.3	0.9
ral 0.1% 32.7 668 17.10n-combi 0.1% 32.7 73.5 668 17.10n-combi 0.15% 32.9 688 17.10n-combi 0.05% 32.9 688 17.10n ppm 32.3 773 773 200 ppm 32.3 773 773 500 ppm 32.3 773 773 500 ppm 32.3 773 773 770 ppm 32.3 770 ppm 42.0 ppm	5.0 66				
rrilon-combi 0.2% 35.1 73.5 668 32.9 688 32.9 688 34.1 688 35.5 688 35.5 73 73 800 ppm 32.3 72 73 70 ppm 32.3 72 73 70 ppm 32.3 70 ppm 42.0 ppm 32.3 70 ppm 42.0 ppm	2.7 66				
Trilon-combi 0.15% 32.9 568 "" 0.3% 32.9 688 "" 0.6% 32.9 688 "" 0.6% 32.9 688 "" 100 ppm 32.3 73 200 ppm 32.3 73 200 ppm 32.5 70 200 ppm 32.5 70 200 ppm 32.9 70	5.1 73				
trilon-combi 0.15% 32.9 688 " 0.3% 34.1 0.6% 35.5 400 ppm 33.3 73 800 ppm 32.3 73 200 ppm 32.5 70 25 ppm 32.5 70 200 ppm 32.5 70 200 ppm 32.5 70 70 ppm 32.5 70 70 ppm 32.5 70 70 ppm 32.5	3,5 66			*	
25 ppm 32.3 73 73 70 ppm 32.3 73 73 70 ppm 32.3 73 73 70 ppm 32.3 70 ppm 32.3 70 ppm 32.5 ppm	2.9 68			-	
0.6% 35.5 68 800 ppm 33.3 73 73 800 ppm 31.9 71 70 ppm 32.5	4.1 68				*
400 ppm 33.3 73 800 ppm 31.9 71 800 ppm 32.3 70 70 200 ppm 32.5 70 70 200 ppm 32.5 70 70 ppm 32.5 70 ppm 32.5 69 200 ppm 32.3 71 74 200 ppm 32.3 71 74 74 750 ppm 32.3 71 74 74 750 ppm 32.3 71 750 ppm 32.0 ppm 32.0 75 75 75 75 75 75 75 75 75 75 75 75 75	5.5 68			*	
800 ppm 31.9 71 100 ppm 32.3 70 200 ppm 38.4 73 25 ppm 36.3 71 50 ppm 32.5 70 100 ppm 32.1 68 200 ppm 32.1 68 200 ppm 32.1 68	3.3 73	-			
100 ppm 32.3 70 200 ppm 38.4 73 73 25 ppm 38.4 77 73 70 ppm 32.5 70 ppm 32.5 69 69 ppm 32.1 74 500 ppm 32.3 71 74 200 ppm 32.3 71 74 74 750 ppm 32.3 71 74 74 750 ppm 32.3 71 750 ppm 32.3 7	1.9 71				
200 ppm 38.4 73 25 ppm 36.3 71 25 ppm 32.5 70 70 ppm 32.5 70 ppm 32.1 70 ppm 32.1 74 ppm 32.0 ppm 32.3 71 74 ppm 32.0 ppm 32.0 65	2,3 70				
25 ppm 36.3 71 50 ppm 32.5 70 70 ppm 32.5 70 70 ppm 32.1 68 69 200 ppm 32.1 74 68 69 200 ppm 32.9 71 74 74 750 ppm 32.9 71 74 750 ppm 32.0 65 65 65 65 65 65 65 65 65 65 65 65 65	8.4 73	*	*		
50 ppm 32.5 70 100 ppm 32.1 68 200 ppm 32.1 68 200 ppm 32.9 74 200 ppm 32.9 71	6.3 71				
100 ppm 34.6 69 200 ppm 32.1 68 100 ppm 32.9 74 200 ppm 32.9 71	2.5 70				
200 ppm 32.1 68 100 ppm 32.9 74 200 ppm 32.3 71	4.6 69			*	*
100 ppm 32.9 74 200 ppm 32.3 71 71 32.0 65	2,1 68				
200 ppm 32.3 71	2.9 74	-		-	
04rol	2.3 71				
	2,0 65	5.6		0.7	. 1
.7 18.	.7	0.2	0.04	0.1	0.1

Regarding the effect of commercial folifertilizers on total soluble solids and total sugars content of tomato fruits, El-Sawah (1981) found a positive relationship in this respect.

Finally, it could be concluded that, spraying tomato plants of cv. strain-B grown as summer crop under conditions similar to that of Kalubia province, with either 0.1% Bayfolan, 0.2% Irral, 0.6% Fetrilon-combi, 400 ppm Fe, or 100 ppm B 3-times is recommended. Such treatments proved to be of very economical value since they increased yielding ability and resulted in producing fruits of high quality and better nutritional value.

REFERENCES

- Amer, S.A. (1981):
 Effect of some growth regulators and some minor elements on growth and yield of tomato.
 M.Sc. Thesis, Faculty of Agric. Sci., Moshtohor, Zagazig University, 56 pages.
- Ashour, N.I. (1973):
 The effect of leaf sprays of 2,4-D and ZnSO₄ on the growth and yield of tomatoes.
 Archiv fur Gartenbau 21: 411-417.
 (c.f. Hort. Abstr., 45: 1095, 1975).
- Association of Official Analytical Chemists, A.O.A.C. (1970): Washington, D.C., 11th edition.
- Balasa, M.P., Florica, C., Pelaghia, S. Anastasia and P. Solange (1977): Effect of treatments with fertilizers and growth regulators on the accumulation of organic and mineral substances in greenhouse tomatoes. Acta Horticulturae, 58: 169-177.
- Mffek, J. (1972):
 The effect of some compounds on tomato yields.
 Rostlinna Vyroba, 18: 695-702.
 (c.f. Hort. Abstr., 43: 6076, 1973).
- El-Sawah, H.M. (1981):
 Special effects of some fertilization methods on tomato production.
 Ph.D. Thesis, Hungarian Academy of Sciences, Budapest-Hungary:
 148 pages.
- Genchev, S. and S. Gyurov (1975):

 Effect of some trace elements on ripening yield of glass-house tomatoes.

 Gradinarstov, 17: 11-14.

 (Hort. Abstr. 47: 3695, 1977).

- Govidan, P.R. (1950):

 A note on the influence of boron on the yield and ascorbic acid content of tomato fruit.

 Curr. Sci., 19: 319.

 (Hort. Abstr., 21: 1707, 1951).
- Hodossi, S. (1973):
 Effect of foliar application of fertilizers on tomato yield.
 Kertgazdasag, 5: 53-60. Hungary.
- Hodossi, S. and N. Hamar (1976):
 Fertilizing methods to supply nutrient demands of plant directly in the tomato grown in Hungary.
 Dokadu Zarubezsnuh Ucsaztnikov. Szekcii, 1: 72-78.
- Lukovnikova, G.A., E.Y.A. Glushchenko and M.L. Aizine (1975):
 The effect of copper on the rate of constituent accumulation in different tomato cultivars.
 Trudy PO Prikladnoi Botanike Genetike i selektsii, 55: 93-10 (c.f. Hort. Abstr., 46: 10410, 1976).
- Mallick, M.F.R. and C.R. Muthukrishana (1980):

 Effect of micronutrients on the quality of tomato (Lycopers
 esculentum Mill). Vegetable Sci. 7: 6-13.
 (c.f. Hort. Abstr., 52: 871, 1982).
- Michel, K., Bilbes, J.K., Hamilton, P.A. Robers and F. Smith (19) Colorimetric method for determination of sugars and related substances. Analytic. Chemistry 28: No. 3.
- Nabhan, H.M. (1966):
 Studies on the suspended matter in Nile water, with special references to its physical and chemical properties.
 M.Sc. Thesis, Fac. Agric., Cairo University: 122 pages.
- Tanev, Z. and L. Stanchev (1978):

 Effect of Bayfolan on earliness and productivity of greenhouse tomatoes.

 Gradinarska i Lozarska Nauka, 15: 63-69.
 (c.f. Hort. Abstr., 50: 1893, 1980).
- Verma, A.N., K. Ram and R. Sharma (1973):
 Growth, yield and quality of tomato (Lycopersicon esulentumill) as affected by foliar applications of boron in sand culture.
 Mysore J. of Agric. Sci., 7: 130-132.
 (c.f. Hort. Abstr., 44: 4023, 1974).
- Woods, M.J. and C.G. Nolan (1968):

 Effect of phosphorus and iron on tomatoes.

 Irish J. Agric. Res., 7: 201-207.

 (c.f. Hort. Abstr., 39: 979, 1969).

تأثير بعض العناصر الصغرى والاسمدة الورقيه التجاريه على محصول وجودة ثمار الطماط

أ • د / سعد عود الرزاق شفش ق د • محمد ربيع جب ل السيد / على عدنان جب ل

اجريت هذه التجربه بمزرعه كليه الزراعه بمشتهر با جامعه الزقازيق بخلال الموسم الصيفي لعان المرب المدن ا

وقد ابت معظم المعاملات المستخد مه الى زيادة عدد الثمار للنبات الواحد وكذلك الحصول المبكر والصالح للتسويق والمحصول الكلى للطماطم نتيجه للرش النباتات ثلاث مرات باستخدام التركيزات التاليه من كل من الحديد (٠٠٠ جسز في الطيون) والبورون بتركيز (١٠٠ جز في الكليون) وكذلك الاسمدة الورقيه التجاريه بتركيزات ١٠٠ من البايفولان ٢٠٠ من الايرال ١٠٠ من الفترولون : (١٥٥ كوميي في كلا الموسمين والرش بالزنك بمعدل (٢٠٠ جسز في الطيون) أو المنجنيز بمعدل (١٠٠ جسز في الطيون) أو المنجنيز بمعدل (١٠٠ جسز في المليون) في الموسم الثاني فقط وكانت الزيادة في المحصول المبكر والصالح للتسويسة والكلى تتراوح بين ١١ – ١٩٤ / ١٩ - ٢٢ / لكل منهما على التوالي نتيجه لتلك المعامسلان مقارنسمه بمعامله الكتروك و

كما ادت معظم المها ملات الى تحسين صفات الجودة الطبيعية للثمار معبرا عنها بطول وقطر وكذلك شكل الثمرة وعلاوة على ذلك تحسنت الصفات الكيميا ويسعة للثمار من حيث محتواها من المواد الصلبة الذائيسة الكلية وفيتامين ج والحموضة الكلية وكذلك السكبيات المختزاة والغيسر مختزلة والسكويسات الكلية وقد كانت أفضل المعاملات التى ادت لاعلى زيادة في حتسم الثمار من فيتاسين جهى الرش بالبايفولان بتركيز ار٠ / كما زادت حموضة الثمسرة نتيجه وش والنياتات يكل من البورون او الزنسك او الحديد او الايسرال بتركيسز ١٠٠ ١ ٠ ٠ ١ ٠ ٠ ٠ ٠ جسرا في المليسون ١ ١٠ / لكمل منهما على الترتيب ٠ كما زادت السكريسات الكلية والسكريسات الكلية والمكريسات المعتمدة مه مقارنسية بالكثيرول في كسلا الموسعيسن والمعاملات المستخدمة بالرشية بالكثيرول في كسلانا المستخدمة بالرشية بالكلية والمناسات المستخدمة بالمعاملات المستخدمة بالمعاملات المستخدمة بالكثيرول في كسلانا الموسعيسن والمعاملات المستخدمة بالمعاملات المعاملات الم