Volume 28 No. (4) Decemb., 1990

ANNALS
OF
Agricultural Science
MOSHTOHOR

QUALITY OF TOMATO FRUITS AS AFFECTED BY SEED-COLD TREATMENT AND RATE OF PHOSPHORUS AND POTASSIUM FERTILIZERS

BY

Abdalla*, I.M.; Eid*, S.M. and Gabal**, A.A.

ZAGAZIG UNIVERSITY
Fac. of Agric. Sc. Moshtohor-Tukh, A.R.E.

QUALITY OF TOMATO FRUITS AS AFFECTED BY SEED-COLD TREATMENT AND RATE OF PHOSPHORUS AND POTASSIUM FERTILIZERS

BY

Abdalla*, I.M.; Eid*, S.M. and Gabal**, A.A.A.

* Fac. of Agric., Moshtohor, Zagazig University.
** Fac. of Agric., Alexanderia University.

ABSTRACT

Two field trials on tomato cv. U.C. 97-3 were carried out at the Exper. Field of Fac. Agric. Moshtohor, Zagazig University in winter seasons of 1987/1988 and 1988/1989 to study the effect of three different levels of P and K fertilizers in combination with seven seed-cold treatments on the physical and chemical characteristics of tomato fruits. Obtained results revealed that the combination between seed-cold treatments (-1°C, -2°C or -3°C for 12 hrs) and the second used level of fertilizers (99 kg N + 48 kg P_2O_5 + 48 kg K_2O/fad.) produced fruits with the highest average fruit weight and diameter. Moreover, the highest values of fruit length and shape index were reported with treatments of exposing seeds to -2°C or -3°C for 24 hrs in combination with the second used level of fertilizers.

Collected data showed also that tomato fruits containing the highest chemical concentration of vit. C, titratable acidity, T.S.S. as well as reducing, non-reducing and total sugars were picked from plants grown from seeds treated with -1°C or -2°C for either 24 hrs in case of the first three constituents or with -1°C for 12 or 24 hrs for fruit sugars content in combination with the highest used level of macro-nutrients (99 kg N + 64 kg P_2O_5 + 72 kg K_2O/fad.).

Finally, it may be concluded that tomato seeds treated with -1°C or -2°C or -3°C for 12 hrs combined with the second used level of fertilizers (99 kg N + 48 kg P_2O_5 + 48 kg K_2O/fad.) added at 3 doses 3, 7 and 11 weeks after transplanting gave fruits of better physical characteristics than those of other used treatments. Moreover, seed-cold treatment at -1°C for 24 hrs with using the third fertilizers level is advisable to obtain fruits of better chemical constituents.

INTRODUCTION

Tomato (Lycopersicon esculentum, Mill) is considered as one of the most important vegetable crops grown in Egypt, not only for local consumption but also for exportation purposes.

One of the main goals of this work is how to produce tomato fruits of good Physical and chemical characteristics especially in winter where the production is still obstructed by many problems. Among the pathways followed for improving the quality of fruits were the seed-cold treatments and application of major elements. It has been reported by many investigator that seed-cold treatments, especially at -1°C or -2°C for 12 or 24 hrs, exerted an increasing effect on average fruit weight (Yasinska, 1972 on tomato and Abdalla et al., 1983 on sweet pepper). Moreover, no significant differences could be detected among the various used used-cold treatments, regarding length, diameter and shape of fruits (Abdalla et al., 1983 working on sweet pepper). The promising effect of P and K fertilizers on average fruit weight has been reported by Jaramillo et al., (1978) and Dimitrov & Rankov (1979) both working on tomato, Farag (1984) on pepper, Abed and Eid (1987) and El-Sawy (1988) all deal with tomato. It has been found also that length and diameter were increased, meanwhile, fruit index of tomato was not significantly affected (Abed and Eid, 1987). Concerning chemical constituents of fruits, Tropina and Nezhdanova (1975), indicated that seed-cold treatment led to the production of high ascorbic acid fruit content. However, no significant differneces were detected regarding vitamin C, titratable acidity and T.S.S. fruit content (Abdalla et al., 1983 on pepper).

As regard to the effect of P and K fertilizers on the chemical constituents of fruits, it was reported that vitamin C was significantly affected (Dimitrov & Rankov, 1979; Abed & Eid, 1987; El-Sawy, 1988 all working on tomato). The fruit T.S.S. content was also increased as a result of P and k fertilizers addition (Dimitrov & Rankov, 1979; Kanesiro et al., 1984 on tomato) or it was not significantly affected (Abed & Eid, 1987 and El-Sawy, 1988 on tomato). Moreover, acidity of tomato fruit juice was increased with increasing P and K fertilizers level (Abed & Eid, 1987; El-Sawy, 1988) as well as reducing, non reducing and total sugars were also increased (Aliev, 1971 on eggplant; Dimitrov and Rankov, 1979 on tomato and Farag, 1984 on sweet pepper).

Therefore, the aim of this investigation is to shed more light on the effect of seed-cold treatment and PK application on tomato fruit quality.

MATERIALS AND METHODS

Two field experiments were performed at the Experimental Farm of the Faculty of Agriculture, Moshtohor, Zagazig University, during winter seasons of 1987/1988 and 1988/1989. Seeds of tomato (Lycopersicon esculentum, Mill) cv. U.C. 97-3 were soaked in distilled water for 48 hrs before exposing seeds to the different used periods and degrees of low temperature of tested seed-cold treatments. Seeds were then sown in the nursery on November 1st 1987 and October 25th 1988. Transplanting took place on December 9th and 5th in 1987 and 1988 years respectively. Transplants were planted at 30 cm apart on one side of ridges 100 cm wide. The experiment included 21 treatments resulted from combination of three different levels of phosphorus and potassium fertilizers (32 kg P_2O_5 + 36 kg K_2O/fad., 48 kg P_2O_5 + 48 kg K_2O/fad. and 64 kg P_2O_5 + 72 kg K_2O/fad.) and seven seed-cold treatments (-1°C, -2°C or -3°C for 12 or 24 hrs. beside the control. The nitrogen fertilizer was added at the rate of 99 kg N/fad. for each level of P and K fertilizers. The fertilizers were applied in the form of ammonium nitrate (33.5% N), calcium superphosphate (16.5% P_2O_5) and potassium sulphate (48% K_2O). Fertilizers were divided into three equal portions and then added at 3, 7 and 11 weeks after transplanting for the first, second and third doses respectively. A split plot design with four replicates was adopted. The plot area was about 1/380 faddan. Other culture practices were carried out as commonly followed in the district. The temperature degrees (°C) and relative humidity (%) prevailing at Kalubia Governorate at the growing seasons of this work are presented at the meterological table.

A respresentative sample of 20 fruits from each experimental plot was taken at three different pickings in the middle of harvesting season, for measuring each of the physical characteristics of fruits, i.e., average weight, length, diameter and shape index and the chemical constituents of tomato fruits, i.e. Both vitamin C content and titratable acidity which were determined in fruit juice according to A.O.A.C. (1970), total soluble solids by hand refractometer and reducing, non-reducing and total sugars percentages of fruits as described by Michel et al., (1956).

- 5 -

The month	Temperature °C			Relative humidity %
	Maximum	Minimum	Average	
	Season 1987/1988			
October	28.1	15.7	21.9	61
November	23.1	8.0	15.6	65
December	19.7	8.6	14.2	68
January	18.0	6.9	12.4	62
February	19.7	7.1	13.4	59
March	22.1	8.4	15.3	57
April	28.2	14.6	21.4	55
May	35.9	17.6	26.8	38
	Season 1988/1989			
October	27.8	14.3	21.0	64
November	22.1	7.7	14.9	64
December	19.2	8.2	13.7	67
January	16.2	5.2	10.7	74
February	19.6	7.5	13.5	62
March	22.3	7.9	15.1	64
April	29.7	11.7	20.7	54
May	31.7	14.5	23.1	48

All collected data were subjected to the statistical analysis mentioned by Snedecor and Cochran (1968).

RESULTS AND DISCUSSION

1- Physical characteristics of tomato fruits:

Data concerned with weight, length, diameter and shape index of fruits as affected by both of seed-cold treatments and P and K fertilizers level as well as their interaction are presented in Tables (1, 2 and 3).

Data presented in Table (1) clearly indicate that most of the used seed-cold treatments increased average weight, length, diameter and shape index of fruit more than those of the control treatment.

It is also evident from the same data in Table (1) that seed-cold treatment at -1°C for 12 hrs resulted in the highest values of average fruit weight with the lowest fruit length compared with other used treatments, the highest fruit diameter and the lowest values of fruit index. These results lead to the conclusion that the heaviest fruits of nearly round shape were accompanied with seed-cold treatments of -1°C for 12 hrs. Such improving effect of this treatment than other was statistically significant in both seasons of this work.

It is obvious from such data that seed-cold treatment at -1°C for 12 hours, which resulted in plants produced fruits of the most suitable and standard physical characteristics are the same that showed the highest total yield. Obtained results may lead to the conclusion that increments of total yield in this respect is due to increments in average weight and diameter of fruits (Table 1) and also to those of number of fruits per plant (as shown in other part of this work).

These results are in agreement with those of Yasinska (1972), who reported that chilling tomato seeds increased mean fruit weight. Moreover, Abdalla et al. (1983), mentioned that average fruit weight was significantly increased due to exposure of pepper seeds to -1°C or -2°C for 12 or 24 hours, meanwhile, no significant differences were detected among the various used treatments, regarding length, diameter and shape of fruits.

Concerning the effect of phosphorus and potassium fertilizers rate, data Table (2) clearly indicate that

Table (1): Effect of seed-cold treatment on physical characteristics of tomato fruits.

Seed-cold treatment: Temperature (°C)	Seed-cold treatment: Time (hrs)	Average fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Shape index (L/D)
		Season 1987/1988			
Control		59.34	6.13	5.10	1.20
-1	12	68.78	6.22	5.64	1.10
	24	64.54	6.23	5.10	1.22
-2	12	67.63	6.62	5.41	1.22
	24	65.41	6.73	5.34	1.26
-3	12	63.81	6.80	5.30	1.28
	24	65.71	6.92	5.25	1.31
L.S.D. at 5%		0.87	0.08	0.18	0.04
		Season 1988/1989			
Control		58.82	6.06	5.02	1.20
-1	12	67.58	6.28	5.45	1.15
	24	65.24	6.33	5.03	1.25
-2	12	66.07	6.62	5.35	1.23
	24	64.49	6.73	5.25	1.28
-3	12	66.63	6.63	5.40	1.22
	24	68.44	6.98	5.25	1.32
L.S.D. at 5%		2.38	0.12	0.17	0.04

Table (2): Effect of rate of phosphorus and potassium fertilizers on physical characteristics of tomato fruits.

Levels of fertilizer N	P_2O_5 (kg/Fad.)	K_2O	Average fruit weight (g.)	Fruit length (cm)	Fruit diameter (cm)	Shape index (L/D)
			Season 1987/1988			
99	32	36	62.97	6.43	5.37	1.19
99	48	48	68.59	6.82	5.30	1.27
99	64	72	63.82	6.31	5.17	1.22
L.S.D. at 5%			1.54	0.13	0.12	0.04
			Season 1988/1989			
99	32	36	60.93	6.43	5.34	1.20
99	48	48	71.47	6.76	5.28	1.28
99	64	72	63.56	6.36	5.13	1.23
L.S.D. at 5%			1.92	0.14	0.13	0.04

the medium level of fertilizers resulted in the highest values of average fruit weight, fruit length and fruit shape index at both seasons. Such increments were significant at both successive growing seasons of this work. However, fruit diameter was increased with the first level of fertilizers and such increment was significant as compared with the third level of fertilizers only.

It is obvious from such data that treatment of medium levels of fertilizers, which resulted in the highest average fruit weight and length, is the same that showed the highest total yield. Obtaiend results may lead to the conclusion that increment of average weight and length of fruits (Table 2) more than of number of fruits per plant.

These results are in accordance with those of Jaramillo et al., (1978) and El-Sawy (1988) on tomato and Farag (1984) on sweet pepper. Moreover, Abed and Eid (1987) mentioned that tomato average fruit weight, fruit length and diameter were affected by level of fertilizers while fruit index (L/D) did not significantly response to used fertulizers level.

Data showing the combined effect of the seed-cold treatment and P, K fertilizers level on fruit pysical characters (Table 3) indicate obviously that differences among different used treatments were significant.

Such data reveal that the seeds exposed to low degrees of temperature (-1°C or -2°C for 12 hours) which resulted in plants, if received the second level of fertilizers (99 kg N + 48 kg P_2O_5 + 48 kg K_2O/fad.), produced fruits with the highest average weight and diameter. However, the higher values of fruit length and fruit index were due to the exposure of seeds to -2°C or -3°C for 24 hours in combination with the second used level of fertilizers.

2- Chemical constituents of tomato fruits:

Regarding the effect of seed-cold treatment on vitamin C, T.S.S. as well as reducing, non-reducing and total sugars, data presented in Table (4) show clearly that most of the used seed-cold tratments significantly increased these constituents of the fruits as compared with the check treatment. However, no significant differences could be detected with respect to titratable acidity in 1987/1988 season. These results are worthy true during 1987/1988 and 1988/1989 growth seasons. The same data show also that the tomato fruits showing the highest content of vitamin C and T.S.S.% were picked from plants grown from seeds treated with -1°C

Table (3): Effect of interaction between seed-cold treatment and fertilization on physical characteristics of tomato fruits.

Level of fertilizer			Seed-cold treatment		Season 1987/1988				Season 1988/1989			
N	P_2O (kg/Fad.)	K_2O	Temperature °C	Time hrs	Average fruit weight (g)	Fruit length (cm)	Fruit dia-meter (cm)	Shape index (L/D)	Average fruit weight (g)	Fruit length (cm)	Fruit dia-meter (cm)	Shape index (L/D)
99	32	36	Control		56.71	6.12	5.22	1.17	52.67	6.00	5.12	1.17
			-1	12	67.90	6.27	6.07	1.03	66.29	6.30	5.57	1.13
				24	60.65	6.12	5.35	1.14	62.97	6.25	5.22	1.19
			-2	12	68.08	6.62	5.40	1.22	62.76	6.55	5.47	1.19
				24	65.62	6.40	5.37	1.19	59.80	6.45	5.42	1.19
			-3	12	57.59	6.57	5.25	1.25	61.84	6.50	5.25	1.23
				24	64.29	6.87	5.25	1.30	60.23	6.95	5.35	1.29
99	48	48	Control		61.13	6.23	4.95	1.25	63.73	6.20	4.85	1.27
			-1	12	71.55	6.23	5.45	1.14	73.10	6.35	5.47	1.16
				24	68.24	6.95	5.30	1.31	70.64	6.85	5.27	1.29
			-2	12	71.39	7.03	5.47	1.28	72.88	6.93	5.37	1.29
				24	68.13	7.15	5.45	1.31	70.30	7.10	5.22	1.36
			-3	12	71.34	7.10	5.35	1.32	75.10	6.80	5.50	1.23
				24	68.37	7.05	5.35	1.31	74.58	7.13	5.27	1.35
99	64	72	Control		60.17	6.03	5.12	1.17	60.07	6.00	5.10	1.17
			-1	12	66.89	6.15	5.40	1.13	63.35	6.23	5.32	1.19
				24	64.73	5.60	4.67	1.19	62.12	5.88	4.60	1.27
			-2	12	63.41	6.20	5.37	1.15	62.58	6.38	5.22	1.22
				24	62.49	6.65	5.20	1.27	63.39	6.63	5.10	1.30
			-3	12	62.49	6.73	5.30	1.26	62.93	6.58	5.47	1.20
				24	64.47	6.83	5.17	1.32	70.50	6.87	5.15	1.23
L.S.D. at 5%					1.50	0.14	0.32	0.07	4.13	0.21	0.30	n.s

Table (4): Effect of seed-cold treatment on chemical constituents of tomato fruits.

Seed-cold treatment Temperature (°C)	Time (hrs.)	Vitamin C (mg/100 cm³ juice)	Titratable acidity (mg/100 cm³ juice)	T.S.S %	Reducing sugars (g./100 g dry weight)	non-reducing sugars (g./100 g dry weight)	Total sugars (g./100 g dry weight)
Season 1987/1988							
Control		34.3	666	6.37	4.13	0.89	5.02
- 1	12	39.2	650	6.60	5.75	1.98	7.73
	24	39.8	671	6.99	5.98	2.10	8.08
- 2	12	39.1	664	6.66	5.48	1.87	7.35
	24	39.9	668	6.86	4.83	1.66	6.49
- 3	12	38.3	645	6.75	3.76	1.30	5.06
	24	38.8	657	6.82	4.22	1.45	5.67
L.S.D. at 5%		1.6	n.s	0.20	0.09	0.07	0.12
Season 1988/1989							
Control		34.6	665	6.49	3.93	0.87	4.86
- 1	12	40.3	654	6.66	5.52	1.85	7.37
	24	40.5	677	7.03	5.78	2.03	7.81
- 2	12	39.7	672	6.73	5.32	1.79	7.11
	24	40.3	679	6.93	4.62	1.57	6.19
- 3	12	38.6	647	6.76	3.60	1.23	4.83
	24	39.0	658	6.91	4.05	1.39	5.44
L.S.D. at 5%		1.7	18	0.15	0.07	0.06	0.14

or -2°C for 24 hours. Moreover, reducing, non-reducing and total sugars were signifciantly increased also showing the highest values in case of treating tomato seeds with -1°C for 24 hrs followed by that of 12 hrs.

The beneficial effect of seed-cold treatment on vitamin C content which was previously recorded by Tropina and Nezhdanova (1975), is in quite confirmity with the results of this study. However, Abdalla et al. (1983), reported that no significant differences were detected among the various used treatments, regarding vitamin C, titratable acidity and T.S.S. contents of sweet pepper fruits.

From data presented in Table (5), it is evident that increasing level of soil application of P and K fertilizers significantly increased vitamin C, total soluble solids as well as reducing, non-reducing and total sugars fruit contents. These variations were obvious at both growing seasons of 1987/1988 and 1988/1989. Meanwhile, acidity fruit content responsed the same as other fruit contents but it did not show any significant response to the used fertilizers levels. In this respect, the highest values, which showed the highest significant increments, were detected in fruits produced from plants fertilized with the highest level of fertilizers (99 kg N + 64 kg P_2O_5 + 72 kg K_2O/fad.).

The increase in vitamin C and T.S.S. content of tomato fruits, due to supplying plants with macro-nutrients, was reported by Dimitrov and Rankov (1979); Kanesiro et al. (1984), Abed and Eid (1987) and El-Sawy (1988) all working on tomato and Aliev (1971) on eggplant.

With regard to the effect of interaction between both of the two main factors, it is evident from data in Table (6) that third used level of fertilizers (99 kg N + 64 kg P_2O_5 ; 72 kg K_2O/fad.) combined with seed-cold treatment at -1°C or -2°C for 24 hours resulted in the highest values of vitamin C, titratable acidity and T.S.S. contents of tomato fruits in both growing seaosns of this work. Moreover, the tomato fruits showing the highest content of reducing, non-reducing and total sugars were produced from plants of the seeds treated with -1°C for 12 or 24 hours and fertilized with the third level of fertilizers. However, such differences did not reach the level of significancy except in the case of vitamin C, T.S.S. and reducing sugars which showed significant increments for the above mentioned treatments at both successive seasons of this work.

Table (5): Effect of rate of phosphorus and potassium fertilizers on chemical constituents of tomato fruits.

Levels of fertilizer N	P_2O_5 (Kg/Fad.)	K_2O	Vitamin C	Titratable acidity	T.S.S	Reducing sugars	Non-reducing sugars	Total sugars
			(mg/100 cm^3 juice)		%	(g./100 g dry weight)		
					Season 1987/1988			
99	32	36	36.4	656	6.57	4.48	1.48	5.96
99	48	48	38.4	657	6.68	4.85	1.58	6.43
99	64	72	40.8	667	6.92	5.29	1.76	7.05
L.S.D. at 5%			0.7	n.s	0.16	0.06	0.04	0.07
					Season 1988/1989			
99	32	36	36.9	660	6.64	4.33	1.39	5.72
99	48	48	38.7	664	6.75	4.66	1.51	6.17
99	64	72	41.4	669	6.97	5.07	1.69	6.76
L.S.D. at 5%			1.1	n.s	0.17	0.05	0.04	0.08

Table (6): Effect of interaction between seed-cold treatment and fertilization on chemical constituents of tomato fruits.

Levels of fertilizers N	P_2O_5 (kg/Fed.)	K_2O	Seed-cold treatment Temperature °C	Time hrs.	Season 1987/1988 Vitamin C	Titratable acidity	T.S.S %	Reducing sugars	Non-reducing sugars	Total sugars	Season 1988/1989 Vitamin C	Titratable acidity	T.S.S %	Reducing sugars	Non-reducing sugars	Total sugars
					mg/100 cm^3 juice			g/100 g dry weight			mg/100 cm^3 juice			g/100 g dry weight		
99	32	36	Control		32.3	655	6.35	3.83	0.75	4.53	32.8	666	6.45	3.63	0.70	4.33
			-1	12	37.3	633	6.43	5.40	1.83	7.23	38.0	651	6.48	5.25	1.65	6.90
				24	39.3	661	6.93	5.63	2.00	7.63	40.0	663	7.00	5.45	1.88	7.33
			-2	12	36.5	669	6.40	5.08	1.75	6.83	37.3	665	6.48	4.95	1.68	6.63
				24	38.3	672	6.75	4.40	1.58	5.98	38.8	669	6.83	4.18	1.45	5.63
			-3	12	33.8	648	6.48	3.40	1.20	4.60	34.3	646	6.40	3.30	1.15	4.45
				24	32.3	654	6.65	3.68	1.30	4.98	37.3	664	6.85	3.55	1.23	4.78
99	48	48	Control		36.3	665	6.45	4.13	0.88	5.01	36.0	655	6.60	3.95	0.80	4.75
			-1	12	39.8	647	6.80	5.70	1.98	7.68	40.8	639	6.85	5.43	1.83	7.26
				24	37.3	656	6.90	5.95	2.10	8.05	37.3	674	6.95	5.75	2.03	7.78
			-2	12	40.0	661	6.50	5.48	1.85	7.33	41.0	685	6.63	5.33	1.78	7.11
				24	39.3	663	6.60	4.85	1.60	6.45	39.5	694	6.70	4.58	1.58	6.16
			-3	12	39.8	644	6.80	3.70	1.28	4.98	39.8	647	6.83	3.55	1.20	4.75
				24	36.5	665	6.68	4.18	1.40	5.58	37.0	658	6.70	4.05	1.35	5.40
99	64	72	Control		34.5	677	6.30	4.43	1.10	5.53	35.3	676	6.43	4.23	1.10	5.33
			-1	12	41.5	669	6.58	6.15	2.13	8.28	42.0	672	6.65	5.88	2.03	7.91
				24	43.0	695	7.15	6.38	2.23	8.61	44.3	696	7.13	6.15	2.20	8.35
			-2	12	40.8	661	7.10	5.90	2.00	7.90	41.0	666	7.10	5.68	1.93	7.61
				24	42.3	670	7.23	5.23	1.80	7.03	42.5	675	7.28	5.10	1.68	6.78
			-3	12	41.3	645	6.98	4.18	1.43	5.61	41.8	648	7.05	3.95	1.35	5.30
				24	42.5	652	7.13	4.80	1.65	6.45	42.8	653	7.18	4.55	1.60	6.15
L.S.D. at 5%					2.8	n.s	0.35	0.15	n.s	n.s	3.0	n.s	0.26	0.13	n.s	n.s

REFERENCES

Abdalla, I.M.; Abed, T.A. and Shafshak, N.S. (1983): The response of winter sweet pepper to some seed-cold tratments. Annals of Agric. Sc., Moshtohor, 20.

Abed, T.A. and Eid, S.M.M. (1987): Effect of plant density and fertilization on yield and quality of tomato fruits. Annals of Agric. Sc., Moshtohor, 25(4).

Aliev, D.A. (1971): The effect of fertilizers on the yield of eggplant. Trudy, Azerbardzhanskil Nauchnoissledovatel skil Institute Zemledeliya. 15: 64-69. (C.F. Hort. Abstr. 43: 6898, 1973).

A.O.A.C. (1970): Association of Official Agricultural Chemists, Methods of analysis, 11th edition, Washington, D.C. U.S.A.

Dimitrov, G.A. and Rankov, V. (1979): Periodic phosphorus and potassium application to early tomatoes Gradinarskai Lozarska Nauka 16: 97-103. (C.F. Hort. Abstr. 50: 7822, 1980).

El-Sawy, I.B. (1988): Effect of frequency of NPK fertilizers application on tomato crop. 2nd Hort. Sci. Conf. Fac. of Agric. Kafr El-Sheikh, Tanta Univ., September.

Farag, S.S.A. (1984): Effect of some nutrients and growth regulator on growth, flowering, productivity, seed quality and some physiological aspects of squash and pepper. Ph.D. Thesis, Fac. of Agric., Moshtohor, Zagazig Univ. 204 pp.

Jaramillo, V.J.; Munoz, A.R. and Cardona, P.E. (1978): The response of tomato to fertilization with N, P, K and various minor elements in alluvial soils of Vall Del-cauca (Colombia). Revista Instituto Colombiano Agropecuario 13(3): 455-463. (C.F. Hort. Abstr., 50: 2615, 1980).

Kanesiro, M.A.B.; Faleros, R.R.S.; Satori, J.L.; Melow, W.J.; Pizauro, J.M. and Banzatto, D.A. (1984): Effect of nitrogen and phosphorus levels on some chemical characteristics of tomato fruit harvested at different maturity stages. (C.F. Hort. Abstr., 55: 1208, 1985).

Michel, K.G.; Hamilton, J.K.; Robers, P.A. and Smith, F. (1956): Colorimetric method for determination of sugars and related substances. Analytic. Chemistry. 28(3).

Snedecor, G.W. and Cochran, W.G. (1968): "Statistical Methods". Iowa Stat. Univ. Press, Ames. U.S.A. 6th Ed., 593 pp.

Tropina, L.P. and Nezhdanova, Z.A. (1975): The reaction of sweet pepper to low temperature. Referativnyi Zhurnal, 7(55): 603. (C.F. Hort. Abstr. 46: 461, 1976).

Yasinska, D.G. (1972): The effect of seed chilling and treatment with fertilizers on tomato yield. Referactivnyi Zhurnal, 9(55): 360. (C.F. Hort. Abstr. 44: 4014, 1974).

تأثير معاملة البذور بالبرودة ومعدل الأسمدة الفوسفاتية والبوتاسية على جودة ثمار الطماطم

ابراهيم محمد عبد الله　　سعيد معوض محمد عيد　　علي عدنان عوض جبل

أجريت تجربتان حقليتان بمزرعة كلية الزراعة بمشتهر جامعة الزقازيق خلال الموسم الشتوي لعامي ١٩٨٨/٨٧ ، ١٩٨٩/٨٨ على الطماطم صنف يو - سي ٩٧ - ٣ لدراسة تأثير تعريض بذور الطماطم للبرودة مع مستويات مختلفة من التسميد الفوسفاتي والبوتاسي للنباتات على جودة الثمار الطبيعية والكيماوية واتضح من النتائج المتحصل عليها أن هذه المعاملات أدت الى :

تحسن صفات الجودة الطبيعية للثمار معبرا عنها بمتوسط وزن وطول الثمرة بمعاملة البذور بدرجة الحرارة -١°م أو -٢°م لمدة ١٢ ساعة وكذلك تحسنت هذه الخواص بالاضافة لشكل الثمرة عند استخدام المستوى الثاني من التسميد .

وكان لتعريض البذور لنفس درجات الحرارة مع المستوى السمادي الثاني أفضل الأثر في زيادة متوسط وزن وقطر الثمرة . أما طول وشكل الثمرة فقد تحسن عند تعريض البذور لدرجة حرارة - ٢°م أو -٣°م لمدة ٢٤ ساعة مع التسميد بالمستوى السمادي الثاني (٩٩ كجم ن + ٤٨ كجم فو٢أ٥ + ٤٨ كجم بو٢أ/فدان) -

تحسنت صفات الجودة الكيماوية للثمار الناتجة من نباتات عرضت بذورها لدرجة حرارة -١°م أو-٢°م لمدة ٢٤ ساعة وذلك بالنسبة لمحتواها من فيتامين ج والحموضة الكلية والمواد الصلبة الذائبة بينما ازداد محتوى الثمار من السكريات المختزلة والغير مختزلة والكلية عند -١°م لمدة ١٢ أو ٢٤ ساعة وقد تحسنت جميع صفات الجودة الكيماوية للثمار بزيادة المستوى المستخدم من السماد حتى المستوى الثالث والذي أظهر أعلى القيم في هذا المجال وعلى ضوء هذه الدراسة فانه يمكن النصح بمعاملة بذور الطماطم المستخدمة كتقاوي بدرجة - ١°م أو ٢°م أو ٣°م لمدة ١٢ ساعة قبل زراعتها مع تسميد النباتات بالمستوى السمادي الثاني تضاف على ثلاث دفعات متساوية بعد ٣ ، ٧ ، ١١ أسبوعا من الشتل وذلك للحصول على ثمار ذات مواصفات طبيعية جيدة أو تعريض البذور لدرجة حرارة -١°م لمدة ٢٤ ساعة مع استخدام مستوى التسميد الثالث للحصول على ثمار ذات أعلى محتوى كيميائي .