

IV- RESULTS AND DISCUSSIONS

The obtained data regarding the influence of the two investigated factors i.e., NK soil application rate and concentration of chelated zinc spray solution and their possible combinations on both Costata and Hachyia persimmon cvs. were studied during both 1999 and 2000 seasons. Such influence was evaluated through the response of the vegetative growth measurements, nutritional status "leaf mineral contents" and some fruiting aspects of the treated trees.

The results obtained during both seasons of study have been discussed and divided into the following main topics.

IV-I- Response of some vegetative growth measurements.

IV-II- Response of leaf mineral content.

IV-III- Response of some fruiting measurements.

IV-IV- Response of some fruit characteristics.

IV-I- Response of some vegetative growth measurements.

Concerning vegetative growth measurements for both Costata and Hachyia persimmon cultivars in response to the specific effect of investigated treatments were presented in Tables (2, 3, 4, 5 and 6) for average increase in shoot length, average number of leaves per shoot, leaf area, leaf dry weight and increase percentage in trunk diameter respectively.

IV-I-1- Average increase in shoot length (cm.)

IV-I-1-A- Specific effect

With respect to specific effect of the NK soil added rates on shoot length (cm), data tabulated in Table (2) displayed clearly that the highest increase of shoot length gained by persimmon trees supplied with both N_2K_2 and N_2K_1 , treatments respectively. The opposite was true with the lowest NK level applied since, N_0K_0 treated trees measured significantly the shortest increase of shoot length. Differences between the NK investigated rates in most cases were significant. Such trend was detected during both 1999 and 2000 seasons for the two studies cultivars under investigation.

As for the specific effect of Zn foliar spray, it is quite evident from the same Table that the two persimmon cultivars under Zn solution spray at 200 ppm resulted in significantly an increase in shoot length over control (water sprayed trees). This was true for the two studied cultivars during the two seasons of study.

IV-I-1-B- Interaction effect

Referring the interaction effect of the different NK x Zn combinations on the average increase in shoot length the concerned data as presented in Table (2) obviously revealed that treated the two persimmon cvs. trees with N_2K_2 x Zn_1 and N_2K_1 x Zn_1 combinations resulted in the highest value of shoot length during both 1999 and 2000 seasons of study. On the other hand, combinations between the N_0K_0 and the water spray " Zn_0 " i.e., $(N_0K_0$ x Zn_0) (control) treatment significantly resulted in the lowest of shoot length increase during the two seasons of study for both Costata and Hachyia persimmon trees. The increase values the other NK x Zn combinations came between for each two cultivars.

Table (2): Average increase in shoot length (cm.) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

HIII L	HIS HIS	(# 91)	Cos	Costata				1	Hachyia	hyia		
Treatments	vii)	1999			2000			1999		- 435	2000	
l fi	Zn o .	Zn i	Mean*	Zn "	r uZ	Mean*	Zn o	Zn 1	Mean*	Zn o	Zn i	Mean*
No Ko	11.67i	13.00i	12.34E	14.33j	16.00j	15.17H	14.33j	16.33h-j	15.33F	17.331	20.67i-1	19.00E
Ž. K.	12.00i	13.67hi	12.84E	15.33j	13.00i	16.67G	14.67ij	19.00gh	16.83EF	19.67j-1	21.67h-k	20.67DE
Nº K	17.67fg	20.00ef	18.83C	20.00g-I	21.67fg	20.83E	19.67gh	19.33gh	19.50D	21.67h-k	23.33f-1	22.50D
N. K.	14.33g-I	16.67f-h	15.50D	18.33hi	18.67hi	18.50F	1-g79-1	19.00gh	18.33DE	18.33Kl	20.67i-1	19.50E
N ₁ K ₁	13.33f	20.00ef	19.17C	20.33gh	26.33cd	23.33D	20.67fg	27.00cd	23.83E	22.33g-j	21.33h-k	21.83D
N ₁ K ₂	20.33ef	28.33bc	24.33B	23.67ef	32.00b	27.83BC	23.00ef	29.33bc	26.16B	25.33e-g	33.33bc	29.33BC
N ₂ K ₀	20.33ef	28.33bc	24.33B	22.67f	31.33b	27.00C	24.00de	29.33bc	26.67B	27.33de	34.00b	30.67AB
N ₂ K ₁	24.67d	30.67b	27.67A	25.00de	32.33b	28.67B	26.00de	31.33b	28.16AB	24.33e-h	30.33cd	27.33C
N2 K2	23.00de	34.00a	28.50A	28.00c	36.00a	32.00A	24.00de	. 36.33a	30.17A	26.00ef	39.00a	32.50A
Mean**	18.52B	21.78A	\bigvee	20.85B	25.81A	\bigvee	20.44B	25.22A	V.	22.48B	27.15A	\bigvee

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

The obtained data regarding the response of average increase in shoot length to the different rates of the NK were supported by the findings of several investigators, (Janjic 1978; Tattini et al 1986; Higazy and Kilany 1987; Kilany and Kilany 1991; Hipps 1992; Mekhael 1994 and Nassef 2000 on apple, peach and pear trees. They reported that shoot length significantly increased by increasing the rate of NK fertilization. As for the influence of Zn foliar spray the present results are in line with the findings of Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000) on pear and apple trees. They mentioned that spraying trees with Zn resulted in an increase on their shoot length.

IV-I-2- Average number of leaves per shoot

IV-I-2-A- Specific effect

Regarding the specific effect of the NK soil applied level on average number of leaves per shoot for both Costata and Hachyia persimmon cvs. during the first and second seasons of study. Data in Table (3) obviously show that the average number of leaves per shoot responded specifically to the NK soil added rate. It was indicated a trend very similar to that found with the average increase in shoot length. In other words, the N₂K₂ treatment was the superior followed by "N₂K₁" one, whereas the control "N₀K₀" fertilization exhibited the least number of leaves per shoot. Such trend was detected for both Costata and Hachyia persimmon cvs. during 1999 and 2000 seasons of study.

With regard to the specific effect of chelated Zn foliar spray solution at 0.0 and 200 ppm., it is quite evident from Table (3) that among the differences the number of leaves per shoot in

most cases were significant. It was also noticed that spraying persimmon trees with Zn at 200 ppm resulted in shoots had relatively number of leaves higher than those of control (sprayed with water only) during both 1999 and 2000 seasons of study.

IV-I-2-B- Interaction effect

the interaction effect of the different Referring combinations between various variables of both investigated factors on number of leaves per shoot of both Costata and Hachyia persimmon trees. Data tabulated in Table (3) displayed obviously that the specific effect of each factor i.e., NK rate and Zn concentration was directly reflected on their combinations during both seasons of study. In other words, the highest number of leaves per shoot was always in concomitant with those combinations between the N2K2 from one hand and the Zn1 (at 200 ppm) from the other. On the other hand, the opposite trend was true with those combinations between the N₀K₀ from one side and those of water spray "Zn₀", however this treatment significantly resulted in the least number of leaves per shoot. Such trend was detected during both 1999 and 2000 seasons of study for the two persimmon evs. under study. In addition, other between the abovementioned two combinations were in extremes.

These results are in harmony with those reported by Sharaf et al (1994); Gomaa et al (1994); Khamis et al (1994) and Nassef (2000), regarding the effect of NK soil application. They stated that number of leaves per shoot was increased by increasing the rate of the NK added on Nemagaurd peach, Communis pear seedling and Le-Conte pear trees. Meanwhile,

Table (3): Average number of leaves per shoot of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

	72 K2	N2 K1	N ₂ K ₀	N: K2	N. K.	N. K.	No K2	Z₀ ₹₁	No Ko		Treatments	
18.19B	30.00a	22.00c	17.67e	22.00c	18.00de	13.67gh	14.67fg	13.33gh	12.33h	Znο		
21.59A	30.00a	29.00a	26.67b	22.00c	20.00cd	20.00cd	17.00e	16.00ef	13.67gh	Znı	1999	
X	30.00A	25.50B	22.17C	22.00C	19.00D	16.83E	15.83EF	14.67F	13.00G	Mean*		Cos
25.37b	29.67d	31.33c	26.33fg	28.67de	25.00gh	22.00i	22.67	22.67i	20.00j	Zn o		Costata
30.93A	41.33a	37.33b	38.00b	37.67b	27.67ef	26.67fg	23.33hi	23.67hi	22.67i	Zn i	2000	
X	35.50A	34.33B	32.17C	33.17C	26.33D	24.33E	23.00F	23.17F	21.33G	Mean*	1-	
26.63B	31.67bc	31.33bc	26.00с-е	30.33b-d	26.00с-е	27.67b	21.67e	24.67с-е	20.33e	Zn "	it.	
31.33A	41.00a	37.00ab	36.67ab	36.67ab	30.33b-d	24.33с-е	31.33bc	23.33de	21.33e	Zn i	1999	
\bigvee	36.33A	34.17A	31.33AB	33.50A	28.17BC	26.00C	26.50BC	24.00CD	20.83D	Mean*		Нас
26.07B	33.00b	32.00b	23.67e-h	31.00bc	27.00de	23.33f-h	21.67gh	21.67gh	21.33h	Zn o		Hachyia
31.19A	42.33a	40.33a	34.00b	34.00b	28.00cd	27.33de	25.33d-g	25.67d-f	23.67e-h	Zn ı	2000	
\bigvee	37.67A	36.17A	28.83C	32.50B	27.50CD	25.33DE	23.50EF	23.67EF	22.50F	Mean*		

^{*} and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

the present results concerning the influence of Zn foliar sprays go in line with those mentioned by Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000) on pear and apple trees in this concern.

IV-I-3- Leaf area

IV-I-3-A- Specific effect

Regarding the influence of the NK soil application rates on leaf area (cm²) of both Costata and Hachyia persimmon trees data are presented in Table (4) obviously displayed that leaf area was significantly responded to the investigated level of the NK soil added. Leaf area significantly was increased by increasing the NK applied level especially with increasing nitrogen rate. The largest leaf area values were obtained by fertilization treatments with N₂K₂, N₂K₁, N₂K₀. Whereas, the opposite was observed with persimmon trees subjected to the N₀K₀ treatment, which significantly exhibited a decrease. Such trend was detected during both 1999 and 2000 seasons of study for the two persimmon cultivars under study.

With respect to the specific effect of zinc foliar spray solution, data obtained in the same table reavled that spraying both Costata and Hachyia persimmon trees with Zn at 200 ppm significantly increased leaf area than the control "Zn₀/water spray". Such trend was true for both persimmon cvs. during the two seasons of this study.

IV-I-3-B- Interaction effect

Concerning the interaction effect of the various NK x Zn combinations, data represented in Table (4) obviously revealed that the specific effect of each studied factor (NK rate and Zn

Table (4): Average leaf area (cm2) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

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Mean**	N2 K2	N2 K1	N ₂ K ₀	N. K.	N. K.	N ₁ K ₀	No K2	No Kı	No Ko		Treatments	
42.07B	49.82a-d	45.40a-f	44.74a-g	41.21c-g	41.08c-g	50.68a-c	35.76fg	34.91g	35.00g	Zno		
45.94A	53.60a	51.92ab	49.92a-d	48.48а-е	49.27а-е	38.36f-g	42.51b-g	39.97d-g	39.44e-g	Zn ı	1999	
\bigvee	51.71A	48.68A	47.33A	44.85AB	45.17AB	44.52AB	39.14C	37.44C	37.22C	Mean*		Cos
44.68B	53.15ab	48.34b-е	50.90b-d	50.11b-d	50.02b-d	39.71ef	38.40ef	35.91f	35.61f	Zn a ·		Costata
51.47A	58.96a	58.46a	54.03ab	54.73ab	51.46b-d	50.83b-d	47.17с-е	45.94cd	41.68d-f	Znı	2000	
\bigvee	56.05A	53.40A	52.46A	52.42A	50.74AB	45.27BC	42.78C	40.92C	38.64C	Mean*		
40.73B	50.56ab	46.91а-е	44.50b-f	41.08c-g	39.77e-g	37.38fg	36.10fg	35.24fg	35.00g	Zn o		
46.75A	54.73a	54.73a	49.27a-d	49.92a-c	42.10b-g	50.77ab	40.39d-g	40.48d-g	38.36e-g	Zn :	1999	
\bigvee	52.65A	50.82AB	46.89A-C	45.50BC	40.94CD	44.08BC	38.24D	37.86D	36.68D	Mean*		Нас
45.50B	51.46a-c	53.48ab	50.11a-c	48.34a-c	47.59a-c	45.94a-c	41.85b-d	38.98cd	31.74d	Zn		dachyia
50.89A	58.96a	58.46a	54.03ab	54.73ab	50.90a-c	48.80a-c	44.78bc	44.41bc	42.95b-d	Zn ı	2000	
\bigvee	55.21A	55.97A	52.07AB	51.53AB	49.24A-C	47.37A-C	43.31B-D	41.69CD	37.35D	Mean*		

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

concentration)was directly reflected on their combinations during both 1999 and 2000 seasons of study. Since, the combinations between the N_2K_2 soil application rate and the Zn foliar spray at 200 ppm concentration exhibited statistically the greatest value in leaf area followed by combinations of $(N_2K_1 \times Zn_1)$ treated trees. In addition, the control trees i.e., persimmon trees that supplied with N_0K_0 treatment and received no chelated zinc "water sprayed/ Zn_0 " were statistically the inferior as exhibited the least value of leaf area. Whereas, other combinations were in between the aforesaid combinations. Such trend was detected during both 1999 and 2000 seasons for both persimmon cultivars under this study.

The present results are in complete agreement with those found by Ludders and Bunemann (1969 a & b); Oud (1970); Tattini et al (1986); Kilany and Kilany (1991); Khamis et al (1994) and Nassef (2000) on apple, pear and peach. They mentioned that leaf area was increased by increasing the level of the NK fertilization. However, the trend of response to Zn foliar spray goes in line with those reported by Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000) on pear and apple trees.

IV-I-4- Leaf dry weight (gm)

IV-I-4-A- Specific effect

With regard to the specific effect of NK soil treatments on leaf dry weight of both Costata and Hachyia persimmon trees Table (5) shows obviously that the highest value of leaf dry weight significantly was in concomitant to the N_2K_2 treated trees followed in a descending order by N_2K_1 , whereas the opposite

was observed with persimmon trees subjected to the N_0K_0 treatment. However, the decrease exhibited by the N_0K_0 treated trees was significant. Other investigated treatment were in between. Such trend was true during both 1999 and 2000 seasons for the two persimmon cvs. under study.

As for the specific effect of Zn concentration in foliar spray solution, data obtained revealed that sprayed chelated Zinc at 200 ppm concentration significantly increased the leaf dry weight than the control "water spray" which induced leaves significantly reended the lightest dry weight value. Such trend was detected for Costata and Hachyia persimmon cvs. during both 1999 and 2000 seasons of study.

IV-I-4-B- Interaction effect

Concerning the interaction effect of the various combinations between the various variables of both investigated factor on leaf dry weight of persimmon cvs., data in Table (5) obviously displayed that the specific effect of each factor (NK rate and Zn concentration) was directly reflected on their combinations during both 1999 and 2000 seasons of study. Hence, the between the N_2K_2 soil application rate and the Zn foliar spray at 200 ppm concentration statistically exhibited the greatest value in leaf dry weight followed by combinations of $(N_2K_1 \times Zn_1)$ treated trees. In addition, the control trees [i.e. persimmon trees that supplied with the N_0K_0 treatment and received no chelated Zinc "water spray/Zn₀"] statistically were the inferior as exhibited the least value of leaf dry weight. Meanwhile, other combinations were in between the aforesaid combinations. Such trend was detected during both 1999 and

Table (5). Average dry weight of leaves of Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

p16	1 20		Cos	Costata					Hachyia	ıyia		
Treatments	il i Da	1999	117	 31 I	. 2000			1999			2000	
M	Zn o	Zn ı	Mean*	Zn o	Zn i	Mean*	Zn "	Zn ı	Mean*	Zn "	Zn i	Mean*
No Ko	0.44i	0.52f-h	0.48E	0.42h	0.48f-h	0.45E	0.521	0.57i-k	0.54G	0.56m	0.65jk	0.61G
No K1	0.45i	0.56ef	0.51DE	0.44gh	0.52ef	0.48DE	0.55k	0.61gh	0.58F	0.611	0.68h-j	0.64F
No K2	0.47hi	0.58de	0.52D	0.47f-h	0.56de	0.52CD	0.59h-j	0.72c	0.65D	0.66i-k	0.69hi	0.68E
Nı Ko	0.50g-I	0.53e-g	0.52DE	0.48fg	0.61b-d	0.55C	0.57jk	0.66ef	0.61E	0.63kl	0.73fg	0.68E
Nı Kı	0.52e-h	0.70b	0.61C	0.49fg	0.69a	0.59B	0.64fg	0.72c	0.68C	0.71gh	0.78d	0.75D
Nı Kı	0.54e-g	0.716	0.63C	p-965.0	0.68a	0.64A	0.67de	0.77b	0.72B	0.75ef	0.82c	0 79C
N ₂ K ₀	0.55e-g	0.65c	0.60C	0.63ab	0.69a	0.66A	0.60hi	P69'0	0.64D	0.68h-j	0.78de	0.73D
N2 K1	0.63cd	0.84a	0.73B	0.62bc	0.56de	0.59B	0.72c	0.81a	0.77A	0.79cd	0.88b	0.83B
N2 K2	0.80a	0.84a	0.82A	0.57c-e	0.69a	0.63A	0.74bc	0.83a	0.79A	0.81cd	0.92a	0.87A
Mean**	0.54B	0.66A	\bigvee	0.53B	0.61A	\bigvee	0.62B	0.71A	\bigvee	0.69B	0.77A	\bigvee

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

2000 seasons for Costata and Hachyia persimmon cultivars under this study.

The present results are in general agreement with those mentioned by some investigators, Ludders and Bynemann (1969 a & b); Oud (1970); Khamis et al(1994); Sharaf et al(1994) and Nassef (2000) on apple, pear and peach. They reported that the leaf dry weight significantly increased by increasing the rate of NK fertilization. As for the influence of Zn foliar spray on leaf dry weight, the present data goes in line of Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000) on apple and pear trees.

IV-I-5- Percentage Increment in trunk Diameter

IV-I-5-A- specific effect

Concerning the increment percentage of trunk diameter of both Costata and Hachyia persimmon trees in response to the specific effect of the NK soil added level. Data tabulated in Table (6) obviously showed that the increment percentage in trunk diameter significantly was increased by raising the applied rate of NK. The highest value of the NK application "N₂K₂" significantly resulted in the greatest value of increment in trunk diameter (3.28 % and 2.44%) for Costata cv. and (2.05 % and 1.44%) for Hachyia cv., followed by those of "N₂K₁" treated trees during both 1999 and 2000 seasons of study, respectively. Moreover, the lowest value of increment % in trunk diameter was statistically gained by the "N₀K₀" treated trees during the two seasons of study. In addition, other NK treatments were in between in this respect.

RESULTS =

Referring the specific effect of the Zn foliar spray solution, data obtained in the same Table during both seasons obviously revealed that there are positive relationship between the Zn concentration and increment percentage in trunk diameter of both persimmon trees. However, the highest increment % in trunk diameter was significantly produced by the spraying trees with Zn at 200 ppm. On the contrary, water sprayed trees statistically showed the lowest increase percentage in trunk diameter. Such trend was detected during both 1999 and 2000 seasons for the two persimmon cvs. under in this study.

IV-I-5-B- Interaction effect

Regarding the interaction effect of the various NK x Zn combinations on trunk diameter increment percentage of both Costata and Hachyia cvs., data presented in Table (6) clearly displayed that the highest increment percentage in trunk diameter was in close relationship with the two persimmon trees subjected to the $(N_2K_2 \times Zn_1)$ treatment followed in a descending order by those of $(N_2K_1 \times Zn_1)$ treated trees. The opposite was true with unfertilized trees $(N_0K_0 \times Zn_0)$ control. On the other hand, the other "NK x Zn" combinations were in between with various tendency of response. Such trend was detected for both Costata and Hachyia persimmon cvs. during 1999 and 2000 seasons of study.

The obtained data concerning the response of increment % in trunk diameter to the different levels of the NK soil applied were supported by the findings of several investigators, Catzeflis (1971); Fielder (1975); Neilson et al (1984); Sharma and Awasthi (1985); Ystaas (1990) and Nassef (2000), they

Table (6): Percentage increment in trunk diameter of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

Mean**	N. K.	N: Kı	N ₂ K ₀	N ₁ K ₂	N ₁ K ₁	N ₁ K ₀	No K2	No Kı	No Ko		Treatments	
1.24B	1.89a-c	1.55a-d	1.27a-d	1.87a-c	1.52a-d	1.45a-d	0.70d	0.68d	0.53d	Zn "		
1.56A	2.20a	2.20a	1.48a-d	2.01ab	1.93a-c	1.29a-d	1.02b-d	0.96bc	0.91cd	Znı	1999	
X	2.05A	1.87AB	1.37A-D	1.94AB	1.73AB	1.22BC	0.86C	.0.82C	0.72C	Mean*		Cos
0.75B	1.13a-c	0.93a-c	0.83bc	1.05a-c	0.85bc	0.71c	0.50c	0.39c	0.39c	Zn ·		Costata
1.05A	1.75a	1.61ab	1.09a-c	1.23a-c	1.06a-c	0.96a-c	0.64c	0.59c	0.53c	Znı	2000	
X	1.44A	1.27AB	0.96A-C	1.14AB	0.96A-C	0.84BC	0.57C	0.49C	0.46C	Mean*		
1.63B	2.90c	2.17e	1.89f	2.12e	1.57gh	1.42h	0.97ij	0.85jk	0.73k	Zn o		
2.13A	3.65a	3.19b	2.39d	2.82c	2.48d	1.66g	1.116	1.10ij	1.10ij	Znı	1999	
X	3.28A	2.63B	2.14D	2.47C	1.98E	1.54F	1.04G	0.96GH	0.87H	Mean*		Hac
1.26B	1.91c	1.55ef	1.51f	1.53f	1.37gh	1.25hi	0.96j	0.69k	0.68k	Zn o	(6)	Hachyia
1.71A	2.96a	2.51b	1.71d	1.87c	1.67de	1.43fg	1.24i	1.02j	0.99j	Zn ı	2000	
	2.44A	2.03B	1.61D	1.70C	1.52E	1.34F	1.18G	0.85H	0.79H	Mean*		

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

reported that increment percentage in trunk diameter was positively affected by the different treatments of the NK fertilization. With respect to the influence of Zn foliar spray, the present results are in line with the findings of Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000) on pear and apple trees in this concern.

IV-II- Response of leaf mineral content

Data obtained during both 1999 and 2000 seasons of study regarding the response of Costata and Hachyia persimmon cultivars to the defferential N; K and Zn fertilization treatments were investigated on the leaf mineral contents from N; P; K; Ca; Mg; Fe; Zn; Mn and Cu, which estimated as a ratio on the dry weight base (% for the fine macroelements and ppm. for the four micro-nutrients) were represented in Tables (7; 8; 9;10; 11; 12;13; 14; and 15); for N; P; K; Ca; Mg; Fe; Zn; Mn and Cu, respectively.

IV-II-1- Leaf Nitrogen Content

IV-II-1-A- Specific effect

With respect to the specific effect of the NK soil applied levels on leaf nitrogen content of both persimmon cvs. under study, data in Table (7) obviously displayed that nitrogen was increased significantly by raising the added rate, however the N_2K_2 treatment resulted in the richest leaves in their N-content during both 1999 and 2000 seasons for the two persimmon cvs. followed in a descending order by those of N_2K_0 in the first season and N_2K_1 treatment in the second one. This was true for the two cultivars under study. On the contrary, persimmon trees received the N_0K_0 treatment induced significantly the poorest

leaves in their N-content. Such trend was detected for both Costata and Hachyia persimmon trees during both 1999 and 2000 seasons of study.

Concerning the specific effect of both concentrations of Zn in foliar spray solution, data obtained from the same table show displayed clearly that leaf N-content responded significantly. The highest N level was closely related to trees sprayed by Zn solution at 200 ppm as compared with the water sprayed one (Zn_0 treatment). Such trend was detected during both the first and second seasons of study for Costata and Hachyia persimmon cvs. in this investigation.

IV-II-1-B- Interaction effect:

Regarding the interaction effect resulted by the various combinations of all investigated rates of both NK soil applied and Zn foliar spray solution, data in Table (7) obviously displayed that the specific effect of each investigated factor under study was reflected directly on their interaction effect. Hence, both Costata and Hachyia persimmon trees subjected to the highest NK soil added rate (N_2K_2) from one hand and Zn spray solution at 200 ppm (Zn_1) from the other, they statistically exhibited the greatest leaf N-content during both seasons of study. On the contrary, the leaves of had the least N content percentage were from unfertilized trees (control), whereas the other (NK x Zn) combinations came in between as compared to the abovementioned two extents. In this respect, such trend was detected during 1999 and 2000 seasons of study for both Costata and Hachyia persimmon cultivars.

Table (7): Leaf nitrogen content (%) of both Costata and Hachvia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

	illa Illa	, sy	Costata	tata					Hachyia	ıyia		
Treatments	Ш	6661			2000			1999			2000	
	Zn o	Zn 1	Mean*	Zn	Zn i	Mean*	Zn "	Zn ı	Mean*	Zn o	Zn ı	Mean*
No Ko	2.12d	2.37b-d	2.25C	2.38f	2.50d-f	2.44C	2.25f	2.53c-f	2.39D	2.30e	2.52c-d	2.41E
Z. K.	2.28cd	. 2.45b-d	2.37BC	2.42ef	2.50d-f	2.46C	2.42ef	2.65b-f	2.53CD	2.43de	2.59cd	2.51DE
No K2	2.37b-d	2.47b-d	2.42BC	2.45ef	2.58b-f	2.52C	2.49d-f	2.77a-e	2.63CD	2.58cd	2.70b-d	2 64CD
N ₁ K ₀	2.28cd	2.38b-d	2.33BC	2.55c-f	2.65a-f	2.60BC	2.75a-e	2.85a-d	2.80A-C	2.55cd	2.72bc	2.63CD
N ₁ K ₁	2.38b-d	2.42b-d	2.40BC	2.62a-f	2.65a-f	2.63BC	2.58b-f	2.90a-d	2.74A-C	2.55c-e	2.77bc	2.66CD
Nı K2	2.45b-d	2.65a-c	2.55AB	2.65a-f	2.80a-c	2.73AB	2.65b-f	2.72a-e	2.68BC	2.75bc	2.88ab	2.82A-C
N ₂ K ₀	2.35b-d	2.60a-c	2.48BC	2.68a-e	2.75a-d	2.72AB	2.67ab	2.92a-c	2.94AB	2.72bc	2.80a-c	2.76BC
N ₂ K ₁	2.58a-c	2.85a	2.72A	2.70a-e	2.85ab	2.78AB	2.62b-f	2.90a-d	2.76A-C	2.80a-c	2.92ab	2.86AB
N ₂ K ₂	2.72ab	2.85a	2.78A	2.78a-d	2.90a	2.84A	2.90a-d	3.08a	2.99A	2.88ab	3.05a	2.97A
Mean**	2.39B	2.56A	\bigvee	2.58B	2.69A	\bigvee	2.67B	2.81A	\bigvee	2.62B	2.77A	\bigvee

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

The obtained results concerning the response of leaf nitrogen content of Costat and Hachyia persimmon trees to the NK soil added level are in accordance with those mentioned by many investigators, Sadoweski et al (1990); Ystaas (1990); Mekhael (1994); Sharaf et al (1994) and Nassef (2000). They reported that the leaf N-content increased by increasing the rate of NK soil applied in some deciduous fruit trees. However, the influence of the Zn foliar spray was in harmony with that reported by Awad and Atawia (1995 a); Kabeel et al (1998) and Kabeel and Khalafalla (2000) on pear and apple trees in this concern.

IV-II-2-Leaf Phosphorus Content

IV-II-2-A- Specific effect

Regarding the leaf P content of both Costata and Hachyia persimmon cvs. trees as influenced by the investigated level of the NK soil applied, data in Table (8) revealed that leaf P content was responded to the NK soil added rates, however the trend was no so firm to be the same during both seasons of study. In spite of the leaf P content to be significantly tended to increase by both (N_0K_1) and (N_1K_1) for Costata in the first season. Whereas, in the second season such increase was on trees treated with N_2K_2 . N_2K_1 , N_2K_0 , N_0K_2 and N_0K_1 . Hachyia cultivar recorded the highest leaves P content on trees fertilized with N_2K_0 in the second season. On the other hand, the least Leaf P content was significantly exhibited on unfertilized trees (control). Such trend was detected during both 1999 and 2000 seasons of study.

Concerning the specific effect of of Zn foliar spray solution, data obtained and tabulated in the same table displayed

obviously that the response was completely absent from the stand point of statistic during 1999 and 2000 seasons for the two persimmon cvs. In other words, both Zn_0 "Water spray" and Zn_1 "200 ppm concentration" did not significantly differ pertaining their specific effect on the leaf P content. Such trend was true during the two seasons of study.

IV-II-2-B- Interaction effect

With respect to the interaction effect of the various NK x Zn combinations on the leaf phosphorus content of both Costata and Hachyia persimmon cvs., data presented in Table (8) clearly showed that $(N_1K_1 \times Zn_1)$ combination exhibited generally the greatest value of leaf P content during 1999 and 2000 seasons of study for Costata persimmon cv. trees. However, the $N_2K_0 \times Zn_1$ and $(N_2K_2 \times Zn_1)$ combinations induced leaves with the highest P content during the first and second seasons, respectively for Hachyia persimmon cv. trees. Moreover, the unfertilized trees (control) or $N_0K_0Zn_1$ treatment were statistically the inferior in this respect. In addition, the other combinations were in between in their effectiveness. Such trend was detected during both 1999 and 2000 for the two persimmon cvs. under study.

The obtained results regarding the influence of the NK soil applied level on leaf P content were supported by the findings of many investigators, Boynton and Compton (1944); Taylor and Goubran (1975 a & b); Rase et al (1984) Gomaa et al (1994) and Nassef (2000) on some deciduous fruit species. Meanwhile, a similar observation was achieved by Kabeel et al (1998) and Kabeel and Khalafalla (2000) on pear and apple

Table (8): Leaf phosphorus content (%) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

			Cox	Costata			100		Нас	Hachvia		
Treatments		. 1999		(1)	2000			1999			2000	
	Zn o	Zn i	Mean*	Zn	Zn i	\lean*	Zn .	7n :	*	7-	2000	
Z _n K _n	3000	3000	0	,					INTEGIL	0.117	1.07	Mean*
No No	0.221	0.221	0.22E	0.24d	0.24d	0.24C	0.20g	0.22f	0.21F	0.22e	0.22e	0.22E
Nº KI	0.35ab	0.32bc	0.34A	0.28c	0.28c	0.29B	0.22f	0.23e	0.23EF	0 24d	0 244	0.74D
Zi Ki	0.26e	0.24ef	0.25D	0.30b	0.31ab	0 3 A	9500	0.74	777			0.440
N. V.	-						0.200	0.1.10	0.23EF	0.25de	0.25cd	0.24D
141 20	0.29cd	0.26e	0.27C	0.30b	0.31ab	0.31A	0.21fg	0.28cd	0.25E	0.24d	0.25cd	0.25CD
Z ₁ K ₁	0.31c	0.36a	0.34A	0.29hc	0.32a	0.31A	0 27d	D28C 0	0 270	0000		
Z. K.	225.0						1	0.1000	0.270	0.200	0.276	0.26C
N N	0.20e	0.34ab	0.30B	0.28c	0.30b	0 29B	0.27d	0.30c	0.28CD	0.26c	0.28bc	0.27B
N2 K0	0.32bc	0.28d	0.30B	0.32a	0.29bc	031A	0.29c	0.39a	0 34A	0.25cd	0 265	3360
N2 K1	0.30c	0.34ab	0.32AB	0.32a	0.32a	0.32A	0.30c	0 296	7000	0 272	20.0	
Z: K:	0.29cd	0 29cd	0 29RC	0 :: 2	4-1:0	, ,				0.11.0	0.000	0.200
× ×				0.000	0.5140	0.32A	0.28Cd	0.346	0.31B	0.29b	0.37a	0.33A
IVIEAU	0.29A	0.29A		0.30.4	0.30A	\setminus	0.27A	0.28A	\bigvee	0.29A	0 29A	$\langle $

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

trees with regard to the response of leaf P content to Zn foliar spray.

IV-II-3-Leaf Potassium Content

IV-II-3-A- Specific effect

Referring the leaf K content of both Costata and Hachyia persimmon cultivars in response to specific effect of the NK soil applied levels, it is clear evident from Table (9) that the leaf K content of the two persimmon cvs. under study responded significantly to the soil application rate of N; K fertilizers. Moreover, the (N_2K_2) ; (N_1K_2) and (N_0K_2) treated trees had leaves contained the highest K concentration, respectively. However, unfertilized trees (control) were statistically the inferior in this respect. Differences were significant between all investigated rates. Such trend was true for both Costata and Hachyia persimmon trees during 1999 and 2000 seasons of study.

As for the response to specific effect of Zn concentration as foliar spray solution on leaf K content of both Costata and Hachyia persimmon cvs. trees, data tabulated in the same Table revealed that spraying persimmon trees with Zn solution at 200 ppm (Zn₁) resulted in a significant increase in the leaf K content over the water sprayed trees from one hand, but the response to the Zn concentration was less pronounced than that of the NK soil applied rate. Such trend was detected during both 1999 and 2000 seasons for Costata and Hachyia persimmon cvs. trees under this investigation.

IV-II-3-B- Interaction effect

With regard to the interaction effect of various combinations of all investigated rates of both NK soil applied and Zn foliar spray solution on leaf K content of Costata and Hachyia persimmon trees, data tabulated in Table (9) displayed obviously that the specific effect of each investigated factor under study was reflected on interaction effect of it's combinations. Hence, the two persimmon cvs. trees subjected to the $(N_2K_2 \times Zn_1)$ combination induced statistically the greatest leaf K content followed in a descending order by $(N_1K_2 \times Zn_1)$ treatment. Meanwhile, the poorest leaves in their potassium content were closely related to the unfertilized trees (control). In addition, the other combinations were in between Such trend was true during both 1999 and 2000 seasons of study for Costata and Hachyia persimmon cultivars in this respect.

The obtained data regarding the response of the K content of both Costata and Hachyia persimmon cvs. trees to the NK soil application rate are in a complete agreement with those mentioned by Titus and Boynton (1952); Bondarrenko (1971); Holland et al (1975) Awasthi et al (1997); Attala (1998) and Nassef (2000). They reported that a significant increase in leaf potassium content with K application rates in some deciduous fruit trees. However, the influence of Zn foliar spray, obtained data are in accordance with findings of Awad and Atawia (1995 a) and Kabeel and Khalafalla (2000). They indicated that pear and apple trees sprayed with different Znic concentrations resulting in the highest leaf K content.

Table (9): Leaf potassium content (%) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

)	ms		Costata	tata					Hachyia	ıyia		
Treatments	54	1999	1		2000		U, a	6661			2000	
	Zn 0	Zn 1	Mean*	" uZ	Zn 1	Mean*	.Zn o	Znı	Mean*	Zn o	Zn 1	Mean*
No Ko	1.22e	1.28de	1.25C	1.271	1.32kI	1.30G	1.27j	1.35ij	1.31F	1.33p	1.410	1.371
No K	1.37c-e	1.45c-e	1.41BC	1.44ij	1.53gh	1.49E	1.50g-1	1.66fg	1.58E	1.591	1.74jk	1.67F
No K	1.93a	2.07a	2.00A	2.06d	2.18c	2.12B	2.11bc	2.24ab	2.17B	2.27f	2.41e	2.34C
N ₁ K ₀	1.28de	1.38c-e	1.33C	1.36k	1.49hi	1.43F	1.36ij	1.62gh	1.49E	1.45n	1.73k	1.59H
N. K.	1.41c-e	1.42c-e	1.41BC	1.55g	1.58g	1.57D	1.69e-g	1.84d-f	1.76D	1.82i	2.00h	1.91E
N ₁ K ₂	1.89ab	1.95a	1.92A	2.03d	2.21c	2.12B	2.26ab	2.35a	2.30AB	2.46d	2.55b	2.51B
N ₂ K ₀	1.35c-e	1.44c-e	1.39BC	1.42j	1.54gh	1.48E	1.42h-j	1.63f-h	1.53E	1.53m	1.75j	1.64G
N ₂ K ₁	1.58cd	1.63bc	1.62B	1.69f	1.86e	1.78C	1.87de	1.97cd	1.92C	2.03g	2.28f	2.16D
N2 K2	1.99a	2.16a	2.07A	2.28b	2.37a	2.33A	2.30ab	2.44a	2.37A	2.51c	2.66a	2.59A
Mean**	1.56A	1.64A	\bigvee	1.68B	1.79A		1.75B	1.90A	\bigvee	1.89B	2.06A	\bigvee

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

IV-II-4-Leaf Calcium Content

IV-II-4-A- Specific effect

Concerning the specific effect of the NK soil application rates on leaf Ca content of both Costata and Hachyia persimmon trees. Table (10) revealed obviously that the leaf Ca percentage was significantly responded to the investigated levels of the NK soil added. Hence, leaf Ca content was increased significantly by increasing the NK applied level, whereas the N₂K₂ soil application was statistically the superior followed in a descending order by those N₂K₁ treatment, on contrary unfertilized trees (control), was significantly the poorest leaves in their Ca content. Such trend was detected during both 1999 and 2000 seasons for the two persimmon cultivars under study.

With respect to the specific effect of concentration of Zn in foliar spray solution, it was be clearly noticed from data presented in the same table that leaf Ca content was responded significantly during both seasons of study for Costata and Hachyia persimmon cvs. However, to the specific effect leaf Ca content of trees sprayed with Zn at 200 ppm concentration, was significantly higher as compared with those sprayed with water only. Such trend was true during both 1999 and 2000 seasons of study for both Costata and Hachyia persimmon trees under this investigation.

IV-II-4-B- Interaction effect

Regarding the interaction effect of the various NK x Zn concentration on the leaf Ca content of both Costata and Hachyia persimmon trees, data tabulated in Table (10) displayed obviously that the two persimmon trees under study subjected to

Table (10): Leaf calcium content (%) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

			Cos	Costata					Нас	Hachyia		
Treatments		6661			2000			1999			2000	
ne del	Zno	Zn :	Niean*	Zn .	Zn 1	Mean*	Zn	Znı	Mean*	Zn o	Zn i	Mean*
No Ko	1.22j	1.40hi	1.31G	1.34i	1.46hi	1.40G	1.33h	1.49gh	1.41E	1.44i	1.55ii	1.50E
No K1	1.35i	1.52fg	1.43F	1.46hi	1.60fg	1.53F	1.42gh	1.61e-g	1.52DE	1.56ij	1.73ch	1.65D
No K2	1.44g-1	1.60ef	1.52E	1.66ef	1.75de	1.71DE	1.57fg	1.70ef	1.63CD	1.65hi	1.83е-ц	1.74C
N ₁ K ₀	1.40hi	1.61ef	1.51E	4 <u>5</u> 6+.1	1.76de	1.62E	1.54fg	1.74d-f	1.64CD	1.54ii	1.90c-f	1.72CD
N. Kı	1.67de	1.78c	1.72C	1.74de	1.85cd	1.80CD	1.80c-e	1 94b-d	1 87B	1 87c-f	1 97h-d	1 97R
N ₁ K ₂	1.71cd	1.88b	1.80B	1.82cd	2.01b	1.918	2.10ab	1.99a-c	2.05A	1.95b-e	2.06ab	2 00 A
N ₂ K ₀	1.46gh	1.73cd	1.60D	1.60fg	1.73d-f	1.67E	1,61e-g	1.92b-d	1.77BC	1 78fg	1 83d-u	1.810
N ₂ K ₁	1.73cd	1.95ab	1.84B	1.76de	1.94bc	1.85BC	1.95a-c	2.07ab	2.01A	1.84d-g	1 99a-c	191B
N2 K2	1.89b	2.04a	1.96A	1.85cd	2.25a	2.05A	2.02ab	2.15a	2.09A	1.92c-e	2.11a	2.01A
Mean**	1.54B	1.73A	\bigvee	1.63B	1.82A	\bigvee	1.71B	1.85A	X	L.73B	F 89.4	X

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zu spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively,

either $(N_2K_2 \times Zn_1)$ or $(N_2K_1 \times Zn_1)$ combination exhibited generally the highest value of leaf Ca content, during both 1999 and 2000 seasons of study. The superiority of the abovementioned two combinations over the other investigated ones waps clearly observed during the two seasons for both Costata and Hachyia cvs. Moreover, the differences were significant as the leaf Ca content was estimated as a percentage of the leaf dry matter. Furthermore, unfertilized trees $(N_0K_0$ treatment) had the lowest statistically leaf Ca content, whereas the other NK x Zn combinations came in between with tendency of variability in their effectiveness. Such trend was detected during both 1999 and 2000 seasons for the two persimmon cvs. under study.

The obtained results concerning the response of leaf Ca content to NK soil application rate are in a complete agreement with those reported by Ludders et al (1974); Bhuani and Bhatia (1986); Ferree and Cahoon (1987); Kassem (1991) and Nassef (2000) on apple, plum and pear trees. They mentioned that the NK fertilization increased leaf Ca content. Moreover, some investigators, Awad and Atawia (1995 a); Kabeel et al (1998) and Kabeel and Khalafalla (2000); found that the same trend of leaf Ca content in response to Zn foliar spray solution was also observed.

IV-II-5-Leaf magnesium Content

IV-II-5-A- Specific effect

Data obtained in Table (10) concerning the leaf magnesium content of both Costata and Hachyia persimmon trees in response to the specific effect of the NK soil application

level, obviously show that leaf magnesium content of persimmon trees were significantly responded to the NK applied rate. However, the highest value of leaf magnesium content was significantly in concomitant to the N_2K_2 treated trees followed in a descending order by those received the N_2K_1 level. Whereas, the opposite was true with those subjected to the lowest NK applied rate i.e. N_0K_0 . Such trend was detected during both 1999 and 2000 seasons of study for the two persimmon cultivars under investigation.

Referring the specific effect of Zn concentration as foliar spray solution, data obtained during both 1999 and 2000 seasons for both Costata and Hachyia persimmon cultivars clearly displayed that spraying the chelated Zn at 200 ppm concentration increased significantly the leaf magnesium content as compared to the water sprayed trees "Zn₀ treatment" during the two seasons of study for both persimmon cvs. as the leaf magnesium content was expressed as percentage of the leaf dry matter.

IV-II-5-B- Interaction effect

With regard to the leaf magnesium content of both Costata and Hachyia persimmon cvs. trees in response to the interaction effect of various NK and Zn concentrations, data in Table (11) shows obviously that the specific effect of each investigated factor was reflected on interaction effect of it's combinations. Thus, the two persimmon cvs. trees subjected to the $(N_2K_2 \times Zn_1)$ combination induced leaves with the highest value of leaf magnesium content followed in a descending order by the $(N_2K_1 \times Zn_1)$. On the other hand, the $N_0K_0 \times Zn_0$ combination (control) statistically produced the inferior leaf

Table (11): Leaf magnesium content (%) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons

-10			Cos	Costata					Hac	Hachyia		
Treatments		1999			2000			1999			2000	
	Zn	Znı	Mean*	Zn .	Znı	Mean*	Zn	Znı	Mean*	Znο	Znı	Mean*
No Ko	0.32h	0.55d-f	0.44F	0.34h	0.52ef	0.43F	0.32i	0.52fg	0.42G	0.38i	0.51gh	0.45F
Z Kı	0.44g	0.58de	0.51E	0.43ਢ	0.59с-е	0.51E	0.45h	0.62e	0.54F	0.45h	0.59fg	0.52E
N: K2	0.47fg	0.59de	0.53E	0.49fg	0.57ef	0.53DE	0.48gh	0.65de	0.56EF	0.48h	0 63ef	0.55DE
N. Ke	0.49fg	0.78b	0.63D	0.49fg	0.67bc	0.58D	0.49gh	0.69cd	0.59DE	0.48h	0.71d	0.59D
N. K.	0.61d	0.816	0.71BC	0.60с-е	0.84a	0.72B	0.66de	0.74c	0.70C	, 0.59f	0.82c	0.71C
N ₁ K ₂	0.61d	0.82b	0.71BC	0.61c-e	0.88a	0.74AB	0.65de	0.83b	0.74B	0.68de	0.90c	0.79B
N2 K0	0.52e-g	0.80b	0.66CD	0.58de	0.69b	0.64C	0.55f	0.66de	0.61D	0.51gh	0.89c	0.70C
N: K	0.61d	0.84ab	0.73B	0.65b-d	0.88a	0.77AB	0.69cd	0.82b	0.75B	0.63d-f	0.99b	0.81B
N: K:	0.70c	0.90a	0.80A	0.65b-d	0.91a	0.78A	0.70cd	0.90a	0.80A	0.66d-f	1.10a	0.88A
Mean**	0.53B	0.73A	\bigvee	0.54B	0.73A	\bigvee	0.55B	0.71A	\bigvee	0 54B	0 79A	M

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

RESULTS =

magnesium content. In addition, the other combinations were in between with a slight tendency of variability in their effectiveness. Such trend was true during both 1999 and 2000 seasons for two persimmon cultivars under study.

The obtained result regarding the response of leaf magnesium content to NK soil added rate are in a complete agreement with those reported by Beattia and Ellenwood (1950); Boynton and Anderson (1956); Bhtani and Bhatia (1986), Kassem (1991); and Nassef (2000). They found that leaf magnesium content was significantly increased with increasing the NK soil application rate. Moreover, some investigators, Awad and Atwia (1995 b). Kabeel et al (1998) and Kabeel and Khalafalla (2000) on pear and apple trees, mentioned that sprayed trees with Zn resulting in increasing leaf magnesium content.

IV-II-6-Leaf Iron Content

IV-II-6-A- Specific effect

With regard to the influence of the NK soil application levels on leaf Fe content as a part per milion of both Costata and Hachyia persimmon cultivars, it is obvious from the data presented in Table (12) that leaf Fe content was significantly responded to the investigated rate of NK soil supplied. The highest value of leaf Fe content was from the trees fertilized with N₂K₂ followed in descending order by N₂K₁ soil application treatment. Such trend was true during both seasons for Hachyia cv. and in the first season only for Costata cv. While, in the second season, Costata trees fertilized with N₁K₂ level recorded the highest values in this respect followed by N₁K₁ treatment.

However, leaves of the unfertilized (N_0K_0) significantly produced the lowest value. Such trend was detected during both 1999 and 2000 seasons for the two persimmon cultivars under study.

Referring the specific effect of Zn sprayed solution on leaf Fe content of both Costata and Hachyia cultivars under study, data obtained during both seasons and tabulated in Table (12) displayed that the response was significantly. Differences were significant as the water sprayed trees (Zn_0) was compared to the (Zn_1) sprayed trees. Such trend was true during both 1999 and 2000 seasons for the tow persimmon cultivars under study.

IV-II-6-B- Interaction effect

Concerning the interaction effect resulted by the various combinations of the all investigated rates of both NK soil applied and Zn foliar spray solution, data in Table (12) revealed that specific effect of both factors under study reflected directly on their interaction effect. Moreover, the combinations between the highest NK soil applied rate (N_2K_2) from one hand and Zn spray solution at 200 pmm from the other exhibited statistically the greatest leaf Fe ppm content during both 1999 and 2000 seasons for both Costata and Hachyia persimmon trees except with the second season for Costata persimmon cv. where both N_1K_2 and N_1K_1 treatments, gave the highest value of leaf Fe content. Meanwhile, the leaves unfertilized trees water spray ($N_0K_0 \times Zn_0$ treatment) had statistically the lowest Fe ppm content. In addition, the other combinations were in between as compared to the abovementioned two extents. Such trend was detected during

Table (12): Leaf iron content (ppm) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

	100		Cos	Costata					Hachyia	ıvia		
Treatments	-ti	1999			2000			6661			2000	
11	Zn o	Zn ı	Mean*	Zn o	Zn i	Mean*	Zn 0	Zn ı	Mean*	Zn o	Zn 1	Mean*
No Ko	139.60k	178.30ij	158.90F	142.40i	181.30f-h	161.80E	156.90m	181.50k	169.20H	149.10j	268.90i	159.00H
No K1	157.80jk	190.40g-1	174.10EF	160.40g-1	194.50d-g	177.40DE	169.701	203.30i	186.50G	162.80i	189.20h	176.00G
N. K.	164.10j	210.00e-h	187.10DE		173.00f-1 229.80a-d	201.40CD	177.60k	218.00h	197.80F	171.30i	216.50g	193.90F
N. K.	188.50hi	215.10d-g	188.50hi 215.10d-g 201.80CD 190.30e-g 241.70a-c 216.00BC	190.30e-g	241.70a-c	216.00BC	193,50j	226.20g	209.80E	187.70h	233.00f	210.40E
N ₁ K ₁	202.40e-1	200.70f-I	201.50CD 222.90b-e	222.90b-e	259.20ab	241.10AB	210.90h	248.60d	229.80D	212.40g	261.60cd	237.00D
N ₁ K ₂	216.40d-f	216,40d-f 246,80a-c	231.60B	240.00a-c	268.50a	254.20A	232.80fg	267.80c	250.30C	247.40e	276.20b	261.80C
N ₂ K ₀	1-J09.861	226.10c-e	212.40C	206.50c-f	206.50c-f 253.20ab	229.90AB	215.40h	239.30ef	227.40D	221.10g	264.50c	242.80D
N. K.	218.70d-f	218.70d-f 255.30ab	237.00B	239.00a-c	239.00a-c 240.60a-c 239.80AB	239.80AB	235.80f	279.70b	257.70B	254.30de	284.70b	269.50B
N2 K2	238.70b-d	266.50a	252.60A	147.00hi	147.00hi 227.80b-d	187.40D	243.50de	291.30a	267.40A	261.60cd	302.40a	282.0CA
Mean**	191.60B	221.00A	\bigvee	191.30B	232.90A	\bigvee	204.00B	239.50A	\bigvee	207.50B	244.10A	\bigvee

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively,

the two seasons for both Costata and Hachyia persimmon trees under study.

The obtained data regarding the response of leaf Fe content to NK soil added level are in agreement with those findings by Joolka et al (1990). On apricot trees; Kassem (1991); Mekhael (1994); Awasthi et al (1997); Attala (1998) on apple trees and Nassef (2000) on pear trees. They indicated that a significant increase in leaf Fe content was occurred with raising the NK applied rates.

Furthermore, influence of Zn foliar spray, data obtained are in accordance with reported by Awad and Atawia (1995 b); Kabeel et al (1998) on pear trees and Kabeel and Khalafalla (2000) on apple trees. They found that sprayed trees with Zn resulting in increasing leaf Fe content.

IV-II-7-Leaf Zinc Content

IV-II-7-A- Specific effect

With respect to the leaf Zn content of both Costata and Hachyia persimmon cultivars in response to specific effect of NK soil added rates, data tabulated in Table (13) displayed clearly that the highest value of leaf Zn content was significantly gained by persimmon trees supplied with both N_2K_2 and N_2K_1 treatments. The opposite was true with the lowest NK applied rate (N_0K_0) treated trees which had significantly the poorest leaves in their Zn content. Such trend was detected during both 1999 and 2000 seasons for Costata and Hachyia persimmon trees as Zn content was expressed as a rate of the leaf dry matter (ppm). Differences were significant between all the NK investigated levels.

As for the specific effect of concentration of Zn as foliar spray solution, it is quite evident from data presented in the same table that spraying the two persimmon cultivats with Zn solution at 200 ppm significantly increased the leaf Zn ppm content over water sprayed trees " Zn_0 spray". Such trend was true during the two seasons of study.

IV-II-7-B- Interaction effect

Regarding the interaction effect of the different combinations between the various variables of both investigated factors NK and Zn concentration on leaf Zn content of both Costata and Hachyia persimmon trees, data tabulated in Table (13) revealed obviously that both N₂K₂ and N2K₁ treated trees and spraying with Zn solution at 200 ppm "Zn₁" resulted in general the highest value of leaf Zn content during both 1999 and 2000 seasons. The superiority of the abovementioned two combinations over the other investigated ones was clearly observed during the two seasons of study for both two persimmon cultivars. The differences were significant as the leaf Zn content was estimated as a part per milion of the leaf dry matter (ppm). On the other hand combinations between the unfertilized treatment (N₀K₀) from one hand and water spray "Zn₀" from the other resulted statistically the lowest leaf Zn content. This trend was detected during both 1999 and 2000 seasons for Costata and Hachyia persimmon cultivars under study.

Table (13): Leaf zinc content (ppm) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

			C ₀	Costata					Нас	Hachvia		
Treatments		1999			2000					700		
	7n	7		1	2000			1999			2000	
2 2	F11.0	1.117	Mean*	Zn o	Znı	Mean*	Zn «	Znı	Mean*	Zn "	Zn	Moon*
No No	22.00k	40.83gh	31.42E	24.67h	42.67ef	33.67E	26 331	41 67f	34 000	167.10		INTERIOR
Z ₀ K ₁	29 00;	47 00£	200 000	20.72		1	10.001	1/0.14	34.UUD	21.671	44.67hi	33.17E
	22.00	SION / 4	J8.00D	29.33h	49.83d	39.58D	28.67hi	41.33f	35.00D	29.50k	53 330-0	41 420
N: K3	31.83ij	51.50ef	41.67D	29.50h	56.00c	42.75D	32 330-1	928 25	73.000	2 / / 2 / 2	, , , , , , , , , , , , , , , , , , ,	77+.T+
Z K	36 004;	42 00-1	2000	20 (2			1000	30.000	780.64	54.6/JK	55.33d-f	45.00D
	0.00111	14.00811	37.000	37.0.0	58.83bc	47.25C	34.00f-h	55.83e	44.92BC	33 331k	57 00c f	75 175
NZ	60,00cd	58.33с-е	59.17AB	40.67e-g	61.83bc	51.25BC	37 03fo	PUU 85	77 5700	3000		10.170
N ₁ K ₂	46 33fo	64 020	25 500	10.73			01.00.18	Jo. Oode	47.32BC	رادد.هد	64.33bc	51.33C
N 77	10:00	04.000	93.58B	40.6/e-g	62.17bc	51.42BC	38.67fg	59.17с-е	48.92B	51.83f-h	405 99	50 17B
N2 70	37.50hi	56.83de	47.17C	37.33fg	60.50bc	48.92C	34.67f-h	65.50bc	50 08B	-	50 501	5 77.7
Z ₂ X ₁	38.33hi	71 50h	54 97R	44 00da	64 501	2				+	09.000-6	280.000
Z, Z,	17 826.	70 /7		11,0000	04.500	24.23AB	64.17b-d	74.17a	69.17A	61.17b-d	80.17a	70.67A
17.4	8100.74	/8.6/2	63.25A	45.67de	70.50a	58.08A	66.83b	78 509	77 67 1	F 767 1)	
Mean**	38.76B	56.83A	\bigvee	36 39B	58 54 A		1000		11.0/2	D-0/0.10	84.6/2	73.17A
* and ** reffer to specific effect of NK fertilization treatments and concentration of Zowenson Let	ecific effect of	VK fertilization	treatments and	Contration			10.000	70.0/A		42.2B	62.83A	X
ude in this	Centre Check III	A Teruization	treatments and	concentration of	Zn sprav solut	int Preparities	Visual Constitution of the					

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. ion, respectively. Values obtained for the investigated characteristic in every

Data obtained for the influence of NK level on leaf Zn content are in general agreement with those mentioned by Rogers (1972); Joolka et al (1990); Kassem (1991); Mekhael (1994); Shraf et al (1994); Awasthi et al (1997) and Nassef (2000) on some deciduous fruit species, who stated that the leaf Zn content was positively related to the NK soil application. However, other investigators, Awad and Atawia (1995 b); Kabeel et al (1998) and Kabeel and Khalafalla (2000) reported a similar trend to that observed concerning the response of leaf Zn content to Zn foliar spray solution.

IV-II-8-Leaf Manganese Content:

IV-II-8-A- Specific effect:

Concerning the leaf Mn content of both Costata and Hachyia persimmon trees in response to specific effect of the NK soil applied levels, it is quite evident from Table (14) that the N_2K_2 treated trees had leaves contained the greatest leaf Mn ppm content followed in a descending order by N_2K_1 treatment, while the opposite was true with unfertilized trees (N_0K_0 treatment). The differences were significant between all investigated NK treatments in most cases as compared each other. Such trend was detected during both 1999 and 2000 seasons for both Costata and Hachyia persimmon cultivars in this study.

Referring the specific effect of Zn concentration in forliar spray solution on the leaf Mn ppm content of the two persimmon cvs., data obtained in the same table during both seasons of study displayed that spraying persimmon trees with Zn solution at 200 ppm. "Zn₁" increased significantly the leaves Mn content over water sprayed trees "Zn₀". Such trend was true during both 1999

and 2000 seasons of study for Costata and Hachyia persimmon evs.

IV-II-8-B- Interaction effect

With regard to the interaction effect of the different (NK x Zn) combinations on the leaf Mn content of both Costata and Hachyia persimmon cvs. data tabulated in Table (14) revealed obviously that the two persimmon cvs. Trees subjected to (N₂K₂ x Zn₁) combination resulted in the highest value of leaf Mn content during both 1999 and 2000 seasons of study followed by N₂K₁ x Zn₁ treatment. Contrary, the combination between the (N_0K_0) and the water spray (Zn_0) (" $N_0K_0 \times Zn_0$ ") significantly showed the lowest value in this respect during the two seasons of study for both Costata and Hachyia persimmon cultivars. Furthermore, the other NK x Zn combinations came in between in their effectiveness. Moreover. differences between investigated combinations were significant. This trend was true during 1999 and 2000 seasons for the two persimmon cvs. under study.

The obtained results regarding the response of leaf Mn content to the NK soil application rate are in general accordance with those found by Jange and Ko (1985); Johanson and Samuleson (1990); Kassem (1991); Mekhael (1994); Sharf et al., (1994); and Nassef (2000). They reported that leaf Mn content significantly increased by increasing the level of the NK applied Meanwhile, a similar observation was achieved by Awad and Atawia (1995 b); Kabeel et al (1998) on "Le-Conte" pear and "Anna" apple trees with regard to the response of leaf Mn content to Zn foliar spray.

Table (14): Leaf manganes content (ppm) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

			Costata	tata					Hachyia	hyia		
Treatments		1999			2000			6661			2000	
	Zn 0	Zn ı	Mean*	∴uZ	Zn :	Mean*	≕ uZ	Zn 1	Mean*	ο uZ	Zn:	Mean*
Nº Kº	23.83j	31.80g	27.82G	28.90m	36.50i-l	32.70G	26.93k	35.00i	30.97G	176.72	37.73ij	32.85G
No K1	26.20i	34.13f	30.17F	34.871	39.17g-1	37.02F	30.20j	38.10h	34.15F	32.53k	43.60fg	38.07F
No K.	28.47h	38.17de	33.32E	36.03j-l	41.67e-g	38.85E	31.70j	39.60h	35.65F	34.27k	47.73e	41.00E
N. K.	28.50h	37.87de	33.18E	35.33kl	42.47ef	38.90E	33.93i	43.03g	38.48E	37.30j	50.87d	44.08D
N. K.	30.57g	39.90cd	35.23CD	37.83h-k	46.77d	42.30D	38.37h	46.53ef	42.70D	42.37gh	54.37c	48.37C
N ₁ K ₂	31.63g	41.53c	36.58C	38.70h-j	50.20c	44.45C	42.70g	51.53c	47.12C	45.73ef	57.60b	\$1.67B
N ₂ K ₁₀	30.30gh	38.87de	34.58DE	37.13i-1	46.33d	41.73D	38.97h	47.73de	43.35D	40.07hi	54.30c	47.18C
N ₂ K ₁	33.73f	49.83b	41.78B	40,40f-h	55.57b	47.98B	44.83fg	55.90b	50.37B	43.00g	59.60b	\$1.30B
N2 K2	36.87e	53.97a	45.42A	43.33e	58.17a	50.75A	49.57cd	62.57a	S6.07A	45.73ef	64.77a	55.25A
Mean**	30.01B	40.67A	\bigvee	36.95B	46.31A		37.52B	46.67A	\bigvee	38.77B	52.29A	X

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively,

IV-II-9-Leaf Cupper Content

IV-II-9-A- Specific effect

Regarding the influence of the NK soil application rates on leaf Cu content of both Costata and Hachyia persimmon trees, data represented in Table (15) obviously show that leaf Cu ppm content was significantly responded to the investigated rate of the NK soil added. However, leaf Cu content was increased significantly by increasing the NK applied level whereas the richest leaves in their cupper content were statistically in closed relationship with those N_2K_2 applied trees followed in a descending order by those of N_2K_1 treatment, while those of the N_0K_0 treatment were significantly the poorest leaves in their Cu content. Such trend was true during both 1999 and 2000 seasons of study for both Costata and Hachyia persimmon cultivars.

As for the response to specific effect of Zn concentration, data obtained revealed that spraying chelated Zn at 200 ppm increased significantly the leaf Cu ppm content than the control "Zn₀/water spray". In other words, Zn₁- sprayed trees statistically induced the richest leaves in their Cu content as compared to Zn₀- sprayed trees during both 1999 and 2000 seasons. Such trend was detected for both Costata and Hachyia persimmon cvs. during the two seasons of study.

IV-II-9-B- Interaction effect

The leaf Cu content of both Costata and Hachyia persimmon cultivars was obviously responded to the various (NK x Zn) combinations, whereas the richest leaf Cu content was achieved by those trees subjected to the ($N_2K_2 \times Zn_1$) and ($N_2K_1 \times Zn_1$) treated trees. The superiority of the

Table (15): Leaf cupper content (ppm) of both Costata and Hachyia persimmon trees in response to the NK soil applied rate, Zn foliar spray and their possible combinations in 1999 and 2000 seasons.

Costata	Costata	Costata	tata						Hachyia	nyia		
6661	6661	11 1 31 1 6	-1 1		2000			1999			2000	12
Zn . Zn : Mean* Zn .	Mean*		Zn		Zn i	Mean*	Zn.	Zn i	Mean*	Zn	Zn:	Mean*
11.20i 11.37hi 11.28F 10.87i	11.28F		10.87	7.	11.37gh	11.12E	11.23g	12.47f	11.85F	11.97j	12.43i	12.20D
11.77gh 12.10e-g 11.93DE 11.20hi	g 11.93DE	11.93DE	11.20	.H	12.03ef	11.62D	12.43f	13.03e	12.73E	12.63hi	13.03f-h	12.83C
11.87f-h 12.20d-g 12.03D 11.53gh	12.20d-g 12.03D		11.53	rh.	12.20de	11.87CD	13.03e	14.03ab	13.53C	12.77j-1	13.20e-g	12.98C
11.33hi 11.87f-h 11.60EF 11.70fg	11.60EF		11.70	,50	12.20de	11.95C	12.87e	13.20de	13.03D	12.87f-1	13.20e-g	13.03C
11.87f-h 12.53b-e 12.20CD 12.30c-e	12.53b-e 12.20CD	_	12.30c-	ø	12.63a-d	12.47B	13.57cd	14.23a	13.90AB	13.27d-f	13.87a-c	13.57B
12.37c-f 12.87bc 12.62B 12.47b-e	12.87bc 12.62B		12.47b	ė	12.70a-c	12.58AB	13.60c	14.03ab	13.82B	13.70b-d	14.03ab	13.87AB
12.47b-e 12.53b-e 12.50BC 11.70fg	12.53b-e 12.50BC		11.70	,50	12.53b-d	12.12C	13.77bc	13.87a-c	13.82B	13.90a-c	13.53c-e	13.72B
12.70b-d 13.08b 12.87AB 12.53b-d	12.87AB	_	12.53b	p-0	12.87ab	12.70AB	13.83a-c	14.20a	14.02AB	13.53c-e	14.03ab	13.87AB
12.73b-d 13.70a 13.22A 12.57b-d	13.22A		12.57b	þ	13.03a	12.80A	14.07ab	14.20a	14.13A	13.87a-c	14.20a	14.03A
12.03B 12.47A 11.87B	X	11.87	11.87	В	12.40A	\bigvee	13.16B	13.70A	\bigvee	13.17B	13.50A	\bigvee

and ** refler to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

abovementioned two combinations over the other investigated combinations was clearly observed during both 1999 and 2000 seasons of study. Differences were significant as the leaf Cu content was estimated as a part per milion of the leaf dry matter. On the other hand, the lowest leaf Cu content was always in concomitant to those unfertilized persimmon trees (control, N_0K_0 x Zn_0 combination). In addition, the other NK x Zn combinations came in between the aforesaid two extents with variable tendency of effectiveness.

These results concerning the influence of the NK soil application rate on leaf Cu content go in line with those obtained by Johanson and Samuleson (1990); Kassem (1991); Mekhael (1994); Awasthi et al (1997) and Nassef (2000) on apple and paer trees. Meanwhile, the present data are in confirmity with those stated by Kabeel et al (1998) and Kabeel and Khalafalla (2000) on pear and apple trees regarding the response of leaf Cu content to Zn foliar spray solution.

IV-III- Response of some fruiting measurements

In this respect fruit set percentage, yield (kg/tree) and yield increment percentage over the control were the fruiting measurements investigated in response to the specific and interaction effects of each investigated factor understudy, NK soil applied levels, concentration of Zn foliar spray solution and their combinations. Data obtained during both 1999 and 2000 seasons for Costata and Hachyia persimmon cultivars are tabulated in Tables (16, 17 and 18).

IV-III- 1- Fruit set percentage

IV-III- 1-A- Specific effect

Regarding the fruit set percentage in response to specific effect of the NK soil application level, data in Table (16) showed that supplying both Coststa and Hachyia persimmon trees with N_2K_2 level resulted in statistically the highest percentage of fruit set during both 1999 and 2000 seasons of study followed by the N_2K_1 for Costata cv. and the N_1K_2 for Hachyia cv. throughout the two seasons of study. Whereas, unfertilized persimmon trees (N_0K_0) showed statistically the least fruit set percentage. Such trend was detected during both 1999 and 2000 seasons of study.

Concerning the response to specific effect of the concentration of the chelated Zinc in the foliar spray solution, it is quite evident from data in Table (16) that fruit set percentage significantly responded, whereas spraying Zn at 200 ppm significantly increased the fruit set percentage than the control " Zn_0 /water spray" during both the first and second seasons for both Costata and Hachyia persimmon cvs. under study.

IV-III- 1-B- Interaction effect

Referring the interaction effect of the various NK soil applied rates combined with the differential Zn foliar solutions, data in Table (16) obviously revealed that both Costata and Hachyia persimmon trees received NK soil added at (N_2K_2) rate associated with spraying with Zinc solution at 200 ppm (Zn_1) as well as the " N_1K_2 x Zn_1 " treated trees during both 1999 and 2000 seasons induced the highest fruit set percentage that surpassed statistically the analogous ones of the other $(NK \times Zn)$ combinations. Contrary to that both persimmon cvs trees

Table (16): Average fruit set percentage of Costata and Hachyia persimmon trees as influenced by soil added level of the NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

E			Co	Costata					100	Hac	Hachyia	Hachyia
Treatments		1999	**************************************		2000				1999	1999	1999	1999 2000
	Zn o	Zn ı	Mean*	Zn o	Zn ı	Mean*	Zn »	_	Znı	Zn 1 Mean*	Mean	Mean*
No Ko	39.871	55.33ij	47.60G	44.26k	54.76	49.51F	34.73j		41.96h	41.96h 38.35F		38.35F
No Ki	57.49g-1	67.08b-d	62.28CD	59.56gh	63.18f	61.37D	45.43g		50.38ef	50.38ef 47.91D		47.91D 52.78fg
No K2	58.79g-1	63.50d-f	61.15D	63.52f	67.50de	65.51C	47.72fg		54.42c	54.42c 51.07C	51.07C	51.07C
Zı Kı	46.82k	56.66hi	51.47F	51.8,11	58.44h	55.13E	37.65i		46.40g	46.40g 42.03E		42.03E
Z ₁ K ₁	59.29f-I	66.70b-d	62.99B-D	62.90fg	71.24bc	67.07BC	49.49ef	E 1	53.71cd	53.71cd 51.60C		51.60C
N ₁ K ₂	61.74f-g	69.57ab	65.66B	64.52ef	73.26b	68.89B	50.55ef		57.29ab	57.29ab 53.92B		53.92B
Z ₂ K ₂	51.72j	58.71g-1	55.22E	49.72j	58.31h	54.01E	39.31i		47.98fg	47.98fg 43.64E		43.64E
N ₂ K ₁	60.25e-h	68.63bc	64.44BC	61.10f-h	72.55bc	66.83BC	51.56de		55.66bc	55.66bc 53.61B		53.61B
N2 K2	64.50с-е	73.25a	68.88A	69.26cd	77.59a	73.43A	53.38cd		59.65a	59.65a 56.52A		56.52A
Mean**	55.61B	64.38A	X	58.52B	66.31A	X	45.54B		51.94A	51.94A	51.94A 52.29B	\langle

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively,

subjected to the " N_0K_0 x Zn_0 " treatment induced the lowest fruit set percentage. In addition, the other combinations were in between with tendency of variability in their effectiveness. Such trend was true during both 1999 and 2000 seasons for Costata and Hachyia persimmon cultivars studied in this investigation.

These results concerning the response of fruit set % to the various levels of the NK were supported by the findings of Lilleland et al (1962) on peach trees; Kulesza and Szafrnek (1990); Hipps (1992) and Attala (1998) on apple trees and Nassef (2000) on Le-Conte pear trees. They indicated that fruit set percentage increased significantly by increasing the rate of NK fertilization. Meanwhile, as for the influence of Zn foliar spray solution, the detected trend from present study goes in line with the findings of Awad and Atawia (1995 b); Kabeel et al (1998) and Kabeel and Khalafalla (2000).

IV-III- 2- Yield "kg fruits per tree

IV-III- 2- A- Specific effect

With regard to the specific effect of the NK soil applied rates on both Costata and Hachyia persimmon cvs. trees productivity (kg fruits/tree), data obtained in Table (17) clearly displayed that the yield of persimmon cvs. trees under study was responded significantly to the investigated NK soil added level during both 1999 and 2000 seasons of study. However, the highest yield/tree was statistically gained by the "N₂K₂" treated trees followed in a descending order by the N₁K₂ level for Costata cv., whereas the greatest yield as kg/tree of Hachyia cv. was significantly produced by the "N₂K₂" followed by N₂K₁ treated trees. Moreover, the opposite was true with unfertilized

trees (N_0K_0) . Such trend was detected during both $1^{\underline{st}}$ and $2^{\underline{nd}}$ seasons of study.

As for the specific effect of concentration of Zn foliar spray solution, it could be noticed clearly from data presented in the same table during both seasons of study for the two persimmon cvs. that yield as kg fruits per tree responded significantly, however increased with increasing Zn concentration. Moreover, the Zn_1 (200 ppm) spray solution was significantly more effective than the Zn_0 (water sprayed trees). This trend was true during 1999 and 2000 seasons for Costata and Hachyia persimmon varieties.

IV-III- 2- B- Interaction effect

Data obtained during both 1999 and 2000 seasons of study for both Costata and Hachyia persimmon cvs., represented in Table (17) revealed obviously that yield of the two persimmon cvs. under study (kg/tree) followed a firm trend regarding their response to the interaction effect of the different combinations between the various variables of both investigated factors "NK rate and Zn concentration". The heaviest yield per tree was always in significant relationship to the ($N_2K_2 \times Zn_1$) treated trees. On the contrary, the lightest crop was significantly in closed relationship to those persimmon trees subjected to the N_0K_0 and water spray (" $N_0K_0 \times Zn_0$ ") treatment. In addition, the other " $NK \times Zn$ " combinations were effective on tree yield, however all surpassed statistically in between regarding their effect on yield per tree of both Costata and Hachyia persimmon cvs. during 1999 and 2000 seasons of study.

Table (17): Average yield (kg)/tree of Costata and Hachyia persimmon trees as influenced by soil added level of the NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

							_					
		Mean*	12.63G	14.43F	14.98E	14.56F	15.38D	15.89C	15.27D	16.75B	17.46A	\bigvee
	2000	Zn i	13,421	15.09gh	15.33fg	14.97g-I	15 57f	16.49d	15.63f	17.38b	17.94a	15 76A
yia		Zno	11.83m	13.78k	14.64i	14.15j	15.18gh	15.28f-h	14.92h-1	16.12e	16.98c	14.76B
Hachyia		Mean*	11.87F	13.89E	14.62D	13.77E	15.21C	15.56C	14.48D	16.19B	16.76A	X
	1999	Znı	12.70i	14.88fg	15.40d-f	14.46g	15.58c-e	16.09c	15.13ef	16.76b	17.59a	15.40A
		Zn o	11.04j	12.90i	13.84h	13.08i	14.84fg	15.04e-g	13.83h	15.61c-e	15.93cd	14.01B
		Mean*	12.71G	14.64F	16.13D	14.35F	16.34D	19.75B	15.31E	17.96C	20.51A	X
	2000	Zn 1	14.30h-j	15.21f-h	16.81de	15.06f-1	16.65de	21.90a	15.93ef	19.34b	22.81a	17.56A
ata		Zn.x	11.13k	14.07ij	15.44fg	13.64j	16.03ef	17.60cd	14.68g-1	16.57e	18.21c	15.26B
Costata		Mean*	12.05H	15.25FG	16.67E	14.83G	20.42D	23.21B	15.71F	22.10C	25.64A	X
	6661	Zn 1	13.09i	16.589	18.38ef	16.93g	21.65c	24.80b	17.56fg	24.50b	27.44a	20.10A
- n.		Zno	11.01j	13.93hi	14.97h	12.73i	19.19de	21.62c	13.87hi	P69'61	23.83b	16.76B
	Treatments		No Ko	Z ₀ K ₁	Zo K	Zı K	N. K.	N ₁ K ₂	N ₂ K ₀	N ₂ K ₁	N2 K2	Mean**

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

The present results, concerning the response of yield in Kg/tree to the NK soil applied rate are in a complete agreement with those reported by Niederholzer et al (1991) on plum trees, Kassem (1991); Kilany and Kilany (1991); Mekhael (1994) and Awasthi et al (1997) on apple and Nassef (2000) on pear trees.

As for the influence of the Zn foliar spray solution, data obtained are in a harmony with those stated by Awad and Atawia (1995 b); Kabeel et al (1998) and Kabeel and Khalafalla (2000) on pear and apple trees, who found that application of Zn as foliar spray significantly increased tree yield.

IV-III-3- Percentage of yield increment over the control IV-III-3- A- specific effect

With respect to the influence of various NK soil added levels on yield increment % over the control of both Costata and Hachyia persimmon cvs. trees, data presented in Table (18) obviously showed that supplying both persimmon cvs. with "N₂K₂" treatment resulted in the greatest increase percentage in yield. Such increase reached about (51.80 % and 47.99 %) for Hachyia cv and (133.10 and 92.42 %) for Costata cv. over the control during both 1999 and 2000 seasons, respectively. Followed in a descending order by the "N₁K₂" treatment. The lowest increment percentage of yield was from N₀K₀Zn₁ treated trees. Furthermore, the differences between the investigated NK soil applied rates were significant. This was true during two seasons of study for the two studied cultivars.

Referring the response to specific effect of Zn concentration in foliar spray solution, it is quite evident from data in the same table that spraying both Costata and Hachyia persimmon cvs. trees with Zn solution at 200 ppm concentration significantly increased the yield increment % over the control, however differences were relatively less pronounced than those found with the specific effect of NK soil added rate. Such trend was detected for the two persimmon cvs. during both 1999 and 2000 seasons of study.

IV-III-3- B- Interaction effect

Regarding the interaction effect resulted by the various NK x Zn combinations on yield increment % over the control, data in Table (18) obviously revealed that the response was typically followed the trend previously detected with the yield increment % as influenced by the NK soil added rate. However, the greatest percentage of yield increment over the control was always in concomitant to the " N_2K_2 x Zn_1 " followed by " N_1K_2 x Zn_1 " treated trees. Whereas the reverse was true with the " N_0K_0 x Zn_0 " treatment. Such trend was true for the two persimmon cvs. under study during both 1999 and 2000 seasons.

The present results are in harmony with those mentioned by Kilany and Kilany (1991); Mekhael (1994); Kabeel et al (1998); Kabeel and Khalafalla (2000) and Nassef (2000) on pear and apple trees, regarding the influence of both Nk soil added rate and the Zn foliar spray solution.

Table (18): Average increment (%) in yield compared with the control of Costata and Hachyia persimmon trees as influenced by soil added level of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

T-			Cos	Costata					Hac	Hachvia		
Treatments		1999			2000			1999			2000	
	Zn "	Zn ı	Mean*	Zn	Znı	Mean*	Zn o	Zn	Mean*	7n	75.	
Z ₀ K ₀	0.00	19.131	9.56H	0.00h	28 526-0	14 26E	0.001	15 001	7 510	2 2 2	112	Mean
_					0		0.001	10.02K	1.510	0.00	13.4/1	6.74J
Na Ki	25.12hi	51.01g	38.06FG	27.33fg	36.27d-g	31.80D	16.89j	34.59g	25.74F	16.61hi	27 93e-g -	22 275
N. K.	36.09h	67.06ef	51.58E	38.54d-g	52.00c-e	45.27CD	25.29	39.47ef	32 38F	24 10a	30 000 f	20.77
Z	15 50:	008 55	307 700	-1-V -C	1007				01:001	1 : 1 0 0	50.00d-1	47.00E
		0000	01.100	10.4400	S-0.7.00	29.80D	18.42	30.91h	24.67F	19.93h	26.85fg	. 23.39F
Z 7	74.37de	96.97c	85.67D	44.68c-g	50.44c-f	47.56C	34.329	41.09de	37.7ID	28 63d-f	3171de	30 17
Z Z	96 526	125 201	110 000	23 751	10000					10.000	01.7100	30.170
+	70.020	120.200	110.00B	04.2000	106.00a	85.14A	41.26d	51.69b	46.48B	29.38d-f	39.87c	34.62C
N2 Kn	25.97hi	59.58fg	42.78F	34.14e-g	43.32c-g	38.73CD	25.29	37.92f	31.61E	26 65fo	P19 CE	70 63.00
Z: K:	78.87d	122.60b	100.70C	49.28c-f	74 916	62 IOB	1150 92	7 73	40 700	3	+	17.000
						0 1 1 0 10	0.00	30000	40.700	30.080	47.516	42.00B
13.73	116.70b	149,40a	133.10A	59.51b-d	125.30a	92.42A	44.35c	59.26a	51.80A	43.93b	52.06a	47 99A
Mean**	57 13B	82.74A	X	37 91B	61 46A		200	25.5				

specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

IV-IV-1- Fruit physical characteristics

The average fruit weight, volume, fruit dimensions (fruit length and fruit diameter) and fruit shape index (fruit length/fruit diameter ratio) were the evaluated physical characteristics of both Costata and Hachyia persimmon fruits pertaining their response to the specific and interaction effects of the various variables of all investigated factors under this study (NK) soil application rates and the concentration of the Zn foliar spray solution. Data obtained during both 1999 and 2000 seasons are tabulated in Tables (19, 20, 21, 22 and 23).

IV-IV-1-1- Fruit weight

IV-IV-1-1-A- Specific effect

Regarding the fruit weight of both "Costata" and "Hachyia" persimmon cultivars as influenced by the specific effect of N and K soil applied rates. Table (19) shows that it significantly responded during both seasons of study. Whereas, the highest rate of N and K " N_2K_2 " significantly resulted in the greatest value, followed in descending order by those of " N_1K_2 " and " N_2K_1 " for "Hachyia" cv. While, " N_2K_1 " and " N_1K_2 " for "Costata" cv. The lightest fruits were gained by unfertilized trees (N_0K_0) "control". Moreover, the other treatments intermediate between the abovementioned treatments. This was true during both seasons of study.

Concerning the specific effect of the Zn Foliar solution, data obtained in the same table during both 1999 and 2000 seasons of study displayed that fruit weight was significantly responded to spraying Zn solution. However, the response was relatively less pronounced as compared to that detected with the

NK applied rate. Moreover, Zn spray solution at 200 ppm (Zn_1) increased significantly the fruit weight of both "Costata" and "Hachyia" persimmon cultivars over water sprayed trees.

IV-IV-1-1-B-Interaction effect

With respect to the interaction effect of the various combinations between the differential variables of investigated factors on fruit weight of both "Costata" and "Hachyia" persimmon cultivars data in Table (19) revealed that the average fruit weight responded significantly to the interactions effect of the various (NKx Zn) combination. Moreover, the heaviest fruit weight was significantly in closed relationship with ($N_2K_2 \times Zn_1$) treatment, followed by ($N_1K_2 \times Zn_1$) treatment. Contrary to that the lightest fruits was always from unfertilized trees ($N_0K_0 \times Zn_0$) "control treatment". Meanwhile, the other combinations were significantly in between. Differences during both 1999 and 2000 seasons for both two cultivars understudy were significant.

The present results are in agreement with those found by Kilany and Kilany (1991); Mekhael (1994); Awasthi et al (1997); Kabeel et al (1998) and Nassef (2000) on apple and pear trees, who reported that fruit weight significantly increased by increasing the rate of NK fertilization. As for the influence of Zn foliar spray the concerned data are in line with those mentioned by Awad and Atawia (1995 b), Kabeel et al (1998) and Kabeel and Khalafalla (2000) on "Le-Conte" pear and "Anna" apple trees.

Table (19): Average fruit weight (gm) of Costata and Hachyia persimmon trees as influenced by soil added level of NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

	bdi ali		Costata	tata	ı				Hachyia	ıyia		
Treatments	no:	1999	(de)		2000			1999			2000	
liu L I	Zn u	Zn 1	Mean*	Zn	Zn 1	Mean*	Zn 0	Zn i	Mean*	Zn	Znı	Mean*
No Ko	81.72k	86.58j-k	84.15E	96.63i	104.90hi	100.80F	141.10h	161.70f-h	151.40E	153.10k	167.70h-k	160.40G
No Ki	92.60h-j	97.93gh	95.26D	111.30f-h	119.50f	115.40E	162.60f-h	178.40c-f	170.50D	172.80g-;	172.80g-j 182.10e-h	177.40EF
N. K2	94.38h-j	100,40gh	97.38D	116.50fg 132.60e	132.60e	124.50D	166.80e-g 195.50b-d 181.20CD 176.00f-1	195.50b-d	181.20CD	176.00f-1	197.60de	187.10DE
Nı K.	88.54i-k	98.66gh	93.60D	107.6fh	129.80e	118.70DE	153.00gh	180.30c-f	180.30c-f 166.70DE	157.20jk	184.00e-g	170.60FG
Nı Kı	,104.30e-g	110.60de	107.50C	148.20d	156.70cd	152.50C	180.20c-f	199.40bc	189.80BC	186.30e-g	202.90d	194.60D
Nı Kı	123.30c	148.80b	136.00B	163.90bc	172.40b	168.10B	190.00b-e	206.70b	198.30B	1-b07.061	220.00c	205.30C
N ₂ K ₀	95.59g-1	101.30f-h	98.45D	4-300.E11	131.10e	122.00DE	171,90d-g 192,00b-e 181,90CD	192.00b-e	181.90CD	165.50i-k	194.20de	179.90EF
N ₂ K ₁	109.30d-f 114.60d	114.60d	112.00C	148.20d	165.80bc	157.00C	192.60b-d	249.30a	221.00A	218.50c	245.10b	231.80B
N2 K2	128.00c	163.40a	145.70A	171.80h	184.60a	178.20A	192.00b-e	265.30a	228.70A	234.50b	265.00a	249.80A
Mean**	102.00B	113.60C	\bigvee	130.80B	144.20A	\bigvee	172.20B	203.20A	\bigvee	183.90B	206.50A	\bigvee

and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

IV-IV-1-2- Fruit volume

IV-IV-1-2-A- Specific effect

Referring the specific effect of the NK soil applied rate and the Zn foliar spray solution on fruit volume (size) of "Costata" and "Hachyia" persimmon cultivars. Data in Table (20) declared that fruit volume of both cultivars under study followed typically the same two trends previously detected with fruit weight concerning the specific effect of either the NK rate or Zn concentration in foliar spray solution. Such two trends of response were true for both "Costata" and "Hachyia" cultivars during both 1999 and 2000 seasons.

IV-IV-1-2-B- Interaction effect

With regard to the interaction effect of the different combinations between the various variables of all investigated factors (NK rates and Zn concentration) on fruit volume of both two cultivars under study, data presented in Table obviously show that the "Hachyia" persimmon trees subjected to the either $(N_2K_2 \times Zn_1)$ or $(N_1K_2 \times Zn_1)$ combinations exhibited generally the greatest volume (size) during both 1999 and 2000 seasons of study. On the other hand, "Costata" persimmon trees received the higher rates of NK soil added associated with spraying the Zn solution at 200 ppm $(N_2K_2 \times Zn_1)$, $(N_2K_1xZn_1)$ and (N₁K₂xZn₁) induced fruits had significantly the greatest volume during both seasons of study. Moreover, the combination of $(N_0K_0 \times Zn_0)$ was the inferior in this respect. This "control" treatment resulted in the smallest fruits for both "Costata" and "Hachyia" persimmon cultivars during both 1999 and 2000 seasons of this investigation.

Table (20): Average fruit volume (ml3) of Costata and Hachyia persimmon trees as influenced by soil added level of NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

	nei Dej	R	Costata	tata					Hachyia	ıvia		
Treatments	juju L 18	6661	PO PO		2000			1999		iş ile	2000	
	Zn	Zn ı	Mean*	Zn ·	Zn i	Mean*	Zn o "	Zn i	Mean*	Zn o	Zn ı	Mean*
No Ko	83.33k	88.67jk	86.00F	98.33h	150.30gh	101.80F	143.30h	163.30fg	153.30G	153.30k	169.30ij	161.303
No K	93.33ii	98.33g-j	95.83E	113.70fg	123.30f	118.50E	168.30e-g	183.30c-e	175.80EF	173.30h-j	185.00f-h	179.20F
Z ₀ K ₂	100 56	100.001	97.50E	120.00f	135.30e	127.70D	171.70ef	201.70bc	186.70DE	1-g07.971	200.00de	189.80DE
N. K.	90.00jk	105.00f-h	97.50E	109.70g	133.30e	121.50DE	151.70gh	185.00c-e	168.30F	160.30jk	186.70e-g	173.50F
Z Z	101.70g-1	111.70ef	106.70D	140.70e	160.00cd	150.30C	183.30c-e	201.70bc	192.50CD 190.00e-g	190.00e-g	205.00d	197.50D
Nı K2	125.00cd	151.70b	138.30B	166.70bc	151.70d	159.20B	191.70b-d	210.00b	208.00C	191.70e-g	222.70c	207.20C
N ₂ K ₀	96.67h-j	106.70fg	101.70DE	114.00fg	133.30e	123.70DE	173.30d-f	193.30bc	183.30DE	166.70ij	J-P00'L61	181.80EF
N ₂ K ₁	113.30ef	116.70de	115.00C	150.70d	168.30bc	159.50B	196.70bc	236.70a	216.70B	220.00c	250.00b	235.00B
N ₂ K ₂	130.00c	166.70a	148.30A	174.30b	187.70a	181.00A	228.30a	243.70a	236.00A	226.70c	270.00a	248.30A
Mean**	103.10B	116.10A	\bigvee	132.00B	144.30A	\bigvee	178.70B	202.10A	\bigvee	184.60B	209.50A	\bigvee

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

The obtained data concerning the response of fruit volume to the different levels of the NK were supported by the findings of several investigators, Boynton and Anderson (1956); Barden and Thompson (1962); Richardson (1986); Raese (1990); Mekhael (1994) and Nassef (2000) on apple and pear trees, who reported that fruit volume was increased by increasing the level of NK fertilization. Concerning, the trend of response to the Zn foliar spray was in accordance with those reported by Awad and Atawia (1995 b); Kabeel et al (1998) and Kabeel and Khalafalla (2000) on "Le-Conte" pear and "Anna" apple trees in this concern.

IV-IV-1-3- Fruit length (height)

IV-IV-1-3-A- Specific effect

With regard to the influence of the NK soil application levels on fruit length of both Costata and Hachyia persimmon cultivars. Table (21) shows obviously that fruit length was significantly responded to the investigated rate of NK soil supplied. Fruit length increased significantly by increasing the NK added rate. The greatest values of fruit length were statistically in closed relationship with those N_2K_2 applied trees followed in a descending order by those of N_2K_1 treatment. These treatments induced fruit with more length than those of the " N_0K_0 " treated trees (control treatment) especially with Costata cultivar. Such trend was true during both 1999 and 2000 seasons.

As for the response to the Zn foliar spray solution, data tabulated in Table (20) displayed that length of both Costata and Hachyia persimmon fruit responded significantly to spraying Zn solution at 200 ppm as compared to the water foliar spray " Zn_0 ".

However, the response was relatively less pronounced as compared to that detected with NK applied levels. Such trend was true for both two cultivars under study during both 1999 and 2000 seasons in this respect.

IV-IV-1-3-B- Interaction effect

Concerning the interaction effect of the various NK soil applied rates combined with the Zn foliar spray solution, Table (21) reveals that Costata and Hachyia persimmon trees received the NK soil application at 2.4 Kg from each element source per tree " N_2K_2 " associated with spraying with Zn at 200 ppm. "Zn₁" (" $N_2K_2 \times Zn_1$ ") during both seasons of study, as well as the " $N_2K_1 \times Zn_1$ " treated trees induced the highest values of fruit length. Contrary to that both Costata and Hachyia persimmon trees subjected to the " $N_0K_0 \times Zn_0$ " treatment induced the least value of fruit length. In addition, other comminations were in between.

The obtained results concerning the response of fruit length to the different levels of NK were confirmed with that reported by Williams and Billingesley (1974); Raese (1990); Kilany and Kilany (1991); Kabeel et al (1998) and Nassef (2000) on apple and pear trees, who mentioned that fruit length significantly increased by increasing the rate of NK fertilization. As for the influence of the Zn foliar spray, the concerned results are in line with the findings of Awad and Atawia (1995 b) and Kabeel and Khalfalla (2000) on "Anna" apple and "Le-Cont" pear trees in this concern.

Table (21): Average fruit length (mm) of Costata and Hachyia persimmon trees as influenced by soil added level of NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

			Co	Costata								
Treatments		1999			2000				Ha	Hachyia		
	Znψ	Zn	M	7	1 1000			1999			2000	
Zo Ko	57.00f	58 674 6	_		1 117	Mean*	Zn	Znı	Mean*	Zn	7n.	
Z. K.		00.070-0	JI.OJE	08.33h	61.33e-h	59.83D	76.33f-h	79 674-		!	1	Mean*
146 7	57.33ef	59.33c-f	58.33DE	59.334h	63 336-0	\rightarrow	1000	17.0/Q-g	/8.00D	70.00h	78.67fg	74.33F
Z: K:	57.67ef	61 001-6	3 7:5 05	50 /2 :	5-700.00	U-Bcc.10	15.67gh	84.33cd	80.00CD	79.00fg	87 676	00 000
Z, K			77.00C-E	18/0'6c	63.67c-g	61.67B-D	77.67f-h	87 6750	2017 00		02.076	OU.OJDE
N 70	57.67ef	58.67d-f	58.17DE	59.67gh	4-955 19	60 5000		07.0700	97.0/BC	78.33fg	88.67cd	83.50D
Z: K:	58.00ef	62.00b-d	60 00C-F	4 355 09	65 001	00.500	/4.55h	81.00d-f	77.67D	76.67g	82.33e-u	79 SOF
Z1 K2	\$ 5000 F	100 03		11-10-00	03.000-e	62.67B-D	78.00f-h	86.67bc	82 33BC	255.08	00 /1 -	
71.77		00.000	01.1780	62.33d-h	64.33c-f	63.33BC	79 336-11	100 00		()	00.0700	84.30CD
.N2 Ko	58.33d-f	63.00bc	60.67CD	4 =00 19	111133			00.3300	83.83B	85.00de	90.67bc	87 83RC
Z; K	62 00k 4	64671		11-200	D-00.550	63.67B	74.00h	88.00bc	81 30B-D	78 005.	+	0000
4	1.000	04.0740	05.55AB	65.67b-d	69.00ab	67.33A	84 000-6	-	2	0.001	70.0/DC	84.33CD
1N2 N2	63.00bc	67.00a	65.00A	67.00a-c	70 672	1 55 33		20.2200	8/.1/A	88.33cd	94.33ab	91.33AB
\lean**	SOROD	4 30 1 A			20.0.0	NCC.OO	86.00bc	94.33a	90 17A	91 6756	07.7	
	-0.070	W0K.10		61.48B	65.00A	\bigvee	70 270	0		20.00	91.338	94.50A
* and ** reffer to specific effect of NK fertilization treatments and concentration of 2	erific effect of N	K fertilization (reatments and o	one it is a first till of			70.070	00. /UA		80.81B	88.22A	X
Kindalan Managara					unius de uls us	on, respectively.	Values obtaine	d for the investi-				

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. the investigated characteristic in every

IV-IV-1-4- Fruit diameter

IV-IV-1-4-A- Specific effect

With respect to the specific effect of the NK applied rate or the Zn concentration in foliar spray solution on fruit diameter of both Costata and Hachyia persimmon cultivars, data tabulated in Table (22) demonstrated trends that typically the same tow previously detected trends with fruit length. On the other words, the widest fruit diameter was statistically gained from both (N_2K_2) and (N_2K_1) treated trees followed by the (N_1K_2) ones. Such tow trends of response were true during both 1999 and 2000 seasons for the tow studied cultivars under this study.

IV-IV-1-4-B- Interaction effect

Concerning the interaction effect of the various combinations between the different variables of all investigated factors on fruit diameter of both Costata and Hachyia persimmon cultivars. Table (22) indicates that the response followed typically the same trend previously found with the former fruit length. However, both $(N_2K_2 \times Zn_1)$ and $(N_2K_1 \times Zn_1)$ combination were statistically more superior whereas the opposite was true with $(N_0K_0 \times Zn_0)$ treatment. Moreover, the other $(NK \times Zn)$ combinations were in between with various tendency of response.

The present data regarding the response of fruit diameter to the different levels of the NK are in accordance with the findings of many investigators, Williams and Billingesey (1974); Raese (1990); Kilany and Kilany (1991); and Nassef (2000) on apple and pear trees. They mentioned that the fruit diameter was positively affected by the different treatments of

Table (22): Average fruit diameter (mm) of Costata and Hachyia persimmon trees as influenced by soil added level of NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

Treatments			0	Costata								
	T	1999			2000				На	Hachvia		
	Zn "	Zn i	Mean*	Zn	7n .			1999			2000	
Za Xa	56.331	60.00d-h	58 17D	357 73		Mean.	2n	Znı	Mean*	Zn	7	
Z K	. 100 73		+	J4.0/I	57.00d-f	55.83D	58 67	11:13			1117	Mean*
INT are a	57.33hi	61.00c-f	59.17CD	55 00ef	57 004 6	+	00.076	OJ.33de	60.00E	57.33g	62 00d-o	
Z. X.	58 00g-1	_	\rightarrow	10000	I-DOO''	36,00D	. 59.00e	63.33cd	61 1700		0:	37.075
	.0.008-1	D-0cc.20	60.17BC	55.00ef	59 67cd	57 2200			OI.I/DE	60.00fg	64.00c-f	62 00FF
NI Ka	57.33hi	60.33c-a	47:885	55.72.0		01.000	ou.uude	65.00c	62.50CD	60 676		
Z K	1755 03	0	\neg	ob.bbet	57.00d-f	56.17D	4P00 09	1 2 63		00.070	9-800.00	63.50C-E
	1-155.65	62.67b-d	60.50BC	67.00d-f	2455 09	200 770		02.070	61.33DE	61.67e-g	63.67c-f	62 67D E
Z1 K2	61.33с-е	62 67h-d	62 000		300.000	38.0/BC	61.00de	65.67bc	63 33B-D	3 25 5		01.010
N, K	50 22 .		02.00D	37.6/de	62.00bc	59.83B	64 676	66 001		1-200.00	0/.0/a-d	65.50C-E
	ח-פננ. ענ	64.33b	61.83B	57 67de	10013			00.0000	65.33B	65.33b-f	68 332-6	4000
Z: K:	63.00bc	67 335	+		2000	80C.6C	60.67de	68.67BC	64 67RC	1 11 13	\neg	00.000
N, V,			W.1.CO	00.6/bc	63.00ab	61 83 A	68 67-1		-	01.000-g	/U.ssab	66.33B-D
7.7.	64.67	67.33a	66.00A	61 67hc	25.33		00.0740	69.33a	69.00A	69.00a-c	70 67ah	V CO 09
Mean**	2000		1	01.0700	00.558	63.50A	68.67ah	71 002	-		+	07.00 AB
	37.34B	65.11A	\setminus	57 I 9B	V02.09			11.000	09.85A	70.67ab	72.00a	71 33 A
and " reffer to sp	ecific officer of v				20.502		62.37B	65.89A	\langle	+		110011
The street of AN ferfilization treatments and concentration of Zn spray solution, respectively and	to taxes saves	N Territization t	reatments and co	incentration of	Zn sprav soluti	OH Preparticular			1	0.7.3/B	67.22A	X
CHANGE OF THE CONTRACT OF THE					The same of the same of	on respective	11.11.					/

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. n, respectively. Values obtained for the investigated characteristic in every the NK fertilization. As for the effect of the Zn foliar spray solution, the obtained data goes in line with those reported by **Awad and Atawia (1995 b) and Kabeel and Khalfalla (2000)** on pear and apple fruit trees.

IV-IV-1-5- Fruit shape index:

IV-IV-1-5-A- Specific effect

Referring the response to specific effect of the various NK soil added levels on fruit shape index (fruit length/fruit diameter ratio) of both Costata and Hachyia persimmon fruits, it is quite from tabulated data in Table (23) that the response was completely absent from the stand point of statistic for the tow cultivars understudy during both 1999 and 2000 seasons except with the (N_2K_0) treatment in the first season only for Costata cv. where the difference was significant.

Concerning the specific effect of the Zn concentration in foliar spray solution, data presented in Table (23) displayed clearly that for the tow cultivars under study a similar trend abovementioned was observed approximately with the Zn foliar spray during both tow seasons except with the 1999 season for Hachyia cultivar where the difference was significant.

IV-IV-1-5-B- Interaction effect

With regard to the interaction effect of the various combinations between the differential variables of investigated factors on fruit shape index of both Costata and Hachyia persimmon cultivaes, data demonstrated in Table (23) shows that the fruit shape index responded so slight to the interaction effect of some combination between (NK x Zn) treatment during both 1999 and 2000 season of study for both Costata and Hachyia

Table (23): Average fruit shape index of Costata and Hachyia persimmon trees as influenced by soil added level of NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

			Cos	Costata		1			Нас	Hachvia		
Treatments		1999			2000			1999			2000	
	Zn	Zn i	Mean*	Zn	Zn	Missan*	7n.	7-		1	1000	
Zn Kn	10171	00771				1410011	0.00	1117	Mean	2n ::	Zn i	Mean*
N V	1.01/6	0.977bc	0.997B	1.067ab	1.083ab	1.075A	1.297ab	1.297ab	1.297A	1.013a	0.993a	1.003 A
No 7	1.003b	0.970bc	0.987B	1.083ab	1.117a	1.100A	1.127b	1.337a	1.232A	0 9902	0 0672	0 000 4
Z Z Z	0 9975	0 08060	0 0000	1 000				1	A Company	0.7700	0.9078	0.990A
NIV	0.22700	0.70000	0.9888	1.090a	0.977b	1.033.A	1.257a	1.360a	1.308.4	0.967a	0.967a	0.967A
NI No	1.003b	0.973bc	0.988B	1.083ab	1.080ab	1.082A	1.240ab	1.293ab	1 267A	0 967a	0 0672	0 067 4
Z: K:	0.997bc	0.990bc	0.993B	1.060ab	1 080ab	1 070 A	1 2834	1 320-4	2024	0000		0.707.7
Z, K,	0 0601	10101						1.52040	1.30ZA	0.960a	0.970a	0.965.A
27 172	0.90000	4010.1	0.985B	1.080ab	1.043ab	1.062A	1.243ab	1.337a	1.290A	0.953a	0.940a	0 947A
N2 Ke	0.983bc	1.217a	1.100A	1.063ab	1.083ab	1.073.A	1.220ab	1 280ah	1 250 4	0 0025		
Z ₂ K ₁	0 9875	0 0405	2000			17 CONTRACTOR 17				0.7030	0.7434	O.YOJA
	0.70/00	0.9400	0.963B	1.083ab	1.100a	1.092A	1.233ab	1.303ab	1.268A	0.960a	0.967a	0.963A
N: 72	0.973bc	0.993bc	0.983B	1.087a	1.083ab	1.085A	1.253ab	1.330ab	202A	2.F0 U	2000	1000
Mean**	0.991A	1.006A	\bigvee	1.077A	1.072A	\bigvee	1 230R	1 217 /		0.7154	0.7034	A COK.0
								1.7177	/	U.9/1A	0.969A	\ /

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. dilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

persimmon fruits except with Hachyia cv. In the second season where the difference was insignificant for all treatments.

The obtained data concerning the response of fruit shape index (fruit length/ fruit diameter) of both Costata and Hachyia persimmon cultivars to both NK soil applied levels and Zn foliar spray solution are in agreement partially with those mentioned by Kabeel *et al* (1998); Nassef (2000) Kabeel and Khalafalla (2000) on "Le-Conte" and "Anna" apple trees.

IV-IV-2- Fruit chemical characteristics

Fruit juice total soluble solids percentage (TSS %), total titratable acidity percentage (Acidity %), the TSS/acid ratio and total tannins percentage were the four chemical characteristics of both Costata and Hachyia persimmon cultivars investigated concerning their response to both specific and interaction effects of the different investigated factors under study viz NK soil applied rate and concentrations of chelated zinc spray solution. The obtained data during both 1999 and 2000 seasons of study dealing with fruit chemical properties are presented in Tables (24, 25; 26 and 27).

IV-IV-2-1- Fruit juice total soluble solids percentage (TSS %)

IV-IV-2-1-A- Specific effect

Data in table (24) declared that there are positive relationship between fruit juice TSS % of both Costata and Hachyia persimmon cvs. and the NK soil applied rate during both 1999 and 2000 seasons. Persimmon trees provided with the highest rate each NK fertilizers per tree (N₂K₂) induced fruits

had the highest TSS %, while the lowest TSS % were gained by (N_0K_0) treated trees. Moreover, all treated trees with other (NK) treatments induced fruit juice TSS % were statistically in between. Differences in fruit juice TSS % due to variable rates of NK soil application were significant for both two cultivars under study during both 1999 and 2000 seasons with some exceptions.

With respect to the specific effect of the Zn foliar spray solution, data obtained obviously revealed that water sprayed trees "Zn₀ treated ones" produced fruits with the lowest juice TSS % during both seasons for both Costata and Hachyia persimmon cvs. The reverse was true with trees sprayed with zinc at 200 ppm (Zn₁ solution), whereas the highest TSS % was observed and the increase was significant during the first and second seasons for the two cultivars under study.

B-Interaction effect

Referring the interaction effect of the different combinations between the various variables of the investigated factors (NK applied rates and Zn spray solution), data in Table (24) revealed that both Costata and Hachyia persimmon trees received the highest (NK) soil rate associated with spraying with zinc solution at 200 ppm (Zn_1) induced fruits with the highest TSS % that surpassed statistically the analogous ones of the other (NK x Zn) combinations. Contrary to that both two persimmon cvs. trees subjected to the control treatment (N_0K_0) and Zn_0 foliar spray (received no chelated zinc/water spray) induced the poorest fruits in their juice TSS content. Moreover, the other combinations were in between. In addition, generally any treatment of the (NK) fertilization combined with spraying

20			CAS	Costata			ı'		Hachyla	nyia		
tilet by l	300	6661) 6 3i	H P)	2000	LT LT		1999		ni ni	2000	
ad ba	Zno	Zn i	Mean*	Zn o	Zn 1	Mean*	Zn o	ı uZ	Mean*	Zn o	Zn	Mean*
-	22.23i	23.57g	22.90F	21.83f	22.33d-f	22.08D	23.83fg	24.50f	24.17D	22.37f	23.17ef	22.77E
200	24.33f	25.33d	24.83D	22.33d-f	23.67a-e	23.00CD	25.33de	25.83cd	25.28C	23.67de	24.00de	23.83CD
Nº K2 26	26.33bc	26.67b	26.50B	24.00a-d	24.80ab	24.40.AB	25.67d	28.17ab	26.92B	23.67de	25.33bc	24.50BC
N1 K0 22	22.77hi	23.33gh	23.05F	22.00ef	22.60d-f	22.30D	22.17h	24.00fg	23.08E	26.33b	23.33d-f	24.83B
N1 K1 24	24.50ef	25.67cd	25.08D	22.97c-f	23.93a-d	23.45BC	24.17fg	26.00cd	25.08C	23,33d-f	24.53cd	23.93CD
Nı K2 25	25.17de	26.50b	25.83C	24.67a-c	25.17a	24.92A	25.83cd	27.50b	26.67B	24.17de	25.33bc	24.75B
N2 Ko 23	23.17gh	24.33f	23.75E	22.67d-f	23.33b-f	23.00CD	23.47g	24.67ef	24.07D	23.50d-f	23.83de	23.67D
N2 K1 25.	25.00d-f	26.17bc	25.58C	24.00a-d	25.33a	24.67A	24.17fg	26.67c	25.42C	24.17de	26.17b	25.17B
N2 K2 26	26.33bc	28.63a	27.48A	24.57a-c	25.37a	24.97A	26.67c	28.50a	27.58A	25,33bc	27.80a	26.57A
Mean** 24	24.43B	25.58A	X	23.23B	24.06A	\bigvee	24.59B	26.20A		24.06B	24.83A	X

and ** reffer to specific effect of NK fertilization treatments and concentration of Zu spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

Zn solution at 200 ppm (NK x Zn_1) had to great extent a comparable effectiveness as compared to each treatment of the (NK) with spraying with water (NK x Zn_0).

From the abovementioned results the beneficial effect of raising the NK rate on fruit juice TSS % as shown may be principally discussed on that fact depending on the real function of potassium in some physiological processes. Since, potassium plays a great role in translocation of carbohydrates from the producer organs (leaves) towards the accumulator organs such as fruits and other perminant plant organs viz trunk, limbs, roots ...etc.

The obtained data are in conformity with those stated by Smock and Boynton (1944); Barden and Thompson (1962); Meheriuk and Lau (1979); Abou Aziz et al (1987); Kilany and Kilany (1991); Lopes et al (1992); Mekhael (1994); Awasthi et al (1997) and Nassef (2000) on apple, persimmon and pear trees, they mentioned that fruit juice TSS % increased significantly by increasing the rate of NK fertilization. Moreover, a similar observation was achieved by Awad and Atawia (1995) and Kabeel and Khalafalla (2000) on pear and apple trees with regard to the response of fruit juice TSS % to Zn foliar spray.

IV-IV-2-2- Fruit juice total acidity percentage

IV-IV-2-2- A- Specific effect

With respect to the influence of the various NK soil applied levels on fruit acidity % of both Costata and Hachyia persimmon cultivars, the tabulated data in Table (25) displayed clearly that the highest value of fruit acidity % was significantly

gained by both tow cvs persimmon trees supplied with " N_2K_0 " followed by " N_1K_0 " treatment. The opposite was true with both " N_0K_2 " and " N_1K_2 " treatments, which had significantly the lowest fruits acidity %. Such trend was detected during both 1999 and 2000 seasons of study.

Referring the response to specific effect of concentration of zinc foliar spray solution, it could be noticed clearly from data represented in the same table for both studied two persimmon cvs. during both 1999 and 2000 seasons of study that fruit acidity percentage responded significantly. However, fruit acidity % decreased with increasing Zn concentration. The differences were significant as the water sprayed trees (Zn_0 treatment) were compared to the Zn_1 sprayed trees.

IV-IV-2-2-B- Interaction effect

Concerning the interaction effect of the various (NK x Zn) concentration on fruit acidity percentage of both Costata and Hachyia persimmon cultivars, data tabulated in Table (25) revealed obviously that both two studied cultivars trees subjected to either the "N₂K₀ x Zn₀" or "N₁K₀ x Zn₀" combinations exhibited generally the highest value of fruit acidity % during both 1999 and 2000 seasons of study. On the other hand, the combinations of both the "N₀K₂ x Zn₁" and "N₁K₂ x Zn₁" during both two seasons resulted statistically in the lowest fruit acidity % for both Costata and Hachyia persimmon trees. Moreover, the other (NK x Zn) combinations came in between with tendency of variability in their effectiveness.

Table (25): Average fruit acidity percentage of Costata and Hachyia persimmon trees as influenced by soil added level of the NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

			Cos	Costata					Hachvia	hvia		
Treatments		1999			. 2000			1999			2000	
	Zn	Zn ı	Mean*	Zn	Znı	Mean*	Zn .	Zn i	Mean*	Zn	Zn	Mean*
No Ko	0.637ab	0.613с-е	0.625B	0.663bc	0.637e-h	0.650B	0.593b-d	0.560g-I	0.577C	0 603a	0.580hc	0 502 4
No Ki	0.600d-f	0.590fg	0.595CD	0.623g-j	0.610jk	0.617D	0.547ij	0.533jk	0.540E	0.563с-е	0.547ef	0.555C
N ₁ K ₂	0.593fg	0.580g	0.587D	0.610jk	0 600k	0.605D	0.533jk	0.520k	0.527F	0.553e	0.530f	0.542D
Z. K.	0.643ab	0.603d-f	0.623B	0.670ab	0.643d-f	0.657B	0.610ab	0.587с-е	0.698B	0 6 1 0 a	0.580bc	0 595 A
N. K.	0.597e-g	0.590fg	0.593D	0:647с-е	0.617i-k	0.632C	0.580d-f	0.570f-h	0.573CD	0.580bc	0.557e	0 568B
Z. K.	0.600d-f	0.587fg	0.593D	0.620h-j	0.613jk	0.617D	0.570e-h	0.553hi	0.562D	0.580bc	0.547ef	0.563BC
N ₂ K ₀	0.650a	0.627bc	0.638A	0.683a	0.657b-d	0.670A	0.623a	0.600bc	0.612A	0.610a	0.593ab	0.602A
N ₂ K ₁	0.617cd	0.597e-g	0.607C	0.640d-g	0.633e-1	0.637C	0.593b-d	0.577d-g	0.585C	0.580bc	0.560de	0.570B
N: K:	0.603d-f	0.590fg	0.597CD	0.647с-е	0.627f-j	0.637C	0.587с-е	0.563f-I	0.575C	0.577b-d	0.550e	0 563BC
Mean**	0.616A	0.597B	X	0.645A	0.626B	X	0.580A	0.560B	\bigvee	0.584A	U.560B	
Mean**	0.616A	0.597B	treatments and	0.645	À	A 0.626B	A 0.626B	A 0.626B 0.580A	0.626B 0.580A 0.560B	A 0.626B 0.580A 0.560B		

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively. ints and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

The obtained results regarding the response of fruit acidity percentage to the NK soil added level are in accordance with findings of Beattie (1954); Barden and Thompson (1962); Meheriuk and Lau (1979); Abou Aziz et al (1987); Lopes et al (1992); Awasthi et al (1997) and Nassef (2000) on apple, persimmon and pear trees. They reported that fruit acidity % was decreased by increasing the rate of NK application. However, other investigators, Awad and Atwia (1995 b); Kabeel et al (1998) and Kabeel and Khalafalla (2000), metioned a similar trend to that observed regarding the response of fruit acidity % to Zn foliar spray solution.

IV-IV-2-3- Fruit juice total soluble solids percentage/total acidity percentage

IV-IV-2-3-A- Specific effect

Data in Table (26) displayed that the ratio of fruit juice total soluble solids %/total acidity % (TSS/acid ratio) of both Costata and Hachyia persimmon cultivars was specifically responded to the investigated rates of the NK soil applied treatments. However, an obvious providing that both persimmon cvs. with the (N_0K_2) treatments induced fruits had the highest TSS/acid ratio followed by the (N_2K_2) treated trees as compared to those of the other investigated rates. Whereas, the lowest fruits TSS/acid ratio were those of persimmon trees subjected to the (N_2K_0) treatment. Differences in fruit juice TSS/acid ratio were significant during both 1999 and 2000 seasons of study for both two-persimmon cultivars.

Referring the specific effect of the chelated zinc concentration in the sprayed solution, data in the same Table

revealed that the water sprayed trees " Zn_0 treated ones" produced fruits with the lowest juice TSS/acid ratio during the two seasons of study for both Costata and Hachyia persimmon cultivars. The reverse was true with such trees sprayed with Zn solution at 200 ppm. Concentration (Zn_1) whereas, the highest TSS/acid ratio was observed and the increase was significant during both 1999 and 2000 seasons for the persimmon cultivars under study.

IV-IV-2-3-B- Interaction effect

With regard to the interaction effect of the various combinations between the various variables of both investigated factors on TSS/acid ratio of both Costata and Hachyia persimmon cultivars, data in Table (26) indicated clearly that the specific effect of each factor (NK rate and Zn concentration) was directly reflected on their combinations during both 1999 and 2000 seasons of study. Since the combination between N_0K_2 soil applied level and Zn at 200 ppm concentration exhibited statistically the greatest value in TSS/acid ratio of both two cultivars under study during 1999 and 2000 seasons. However, (N2K $_0$ x Zn $_0$) treatment was statistically the inferior as exhibited the least value of TSS/acid ratio for both Costata and Hachyia persimmon cultivars during the two seasons of study.

The present data are in general agreed with those reported by Abou Aziz et al (1987); Kilany and Kilany (1991) Mekhael (1994), Awasthi et al(1997) and Nassef (2000) on pear and apple trees concerning influence of NK soil application rate. However, a similar observation was achieved by Awad and Atawia (1995 b), Kabeel et al (1998) and Kabeel and

Table (26); Average fruit T.S.S./Acid ratio percentage of Costata and Hachyia persimmon trees as influenced by soil added level of the NK fertilizer, concentration of Zn spray solution and their possible combinations during 1999 and 2000 seasons.

	erl Lot		Costata	tata					Hachyia	ıyia		
Treatments	bel le	6661	ii l	J.	2000			1999			2000	
h Mu	Zno	Zn i	Mean*	Zn o	Zn :	Mean*	Zn o	Zn:	Mean*	Zno	Zn ı	Mean*
No Ko	35.57i	38.23gh	36.90E	33.03f	35.10ef	34.07C	40.17h	43.77fg	41.67D	37.13h	39.87fg	38.50E
No K	40.60e-g	42.93b-e	41.77D	35.93c-f	38.73a-e	37.33B	46.43d-f	48.60b-d	47.52B	42.00de	44.07c	43.03CD
No K	44.10bc	45.50b	44.80AB	39.50a-c	41.40a	40,45A	48.13c-e	54,40a	51.27A	42.70cd	47.83b	45.27B
Z X	38.13gh	37.03hi	37.58E	33.07f	35.30ef	34.18C	36.43i	41.07h	38.75E	43.17cd	40.23e-g	41.70D
N. K.	41.37d-f	41.37d-f 43.63b-d	42.50CD	35.53d-f	39.00a-d	37.27B	41.47gh	46.10d-f	43.78C	40.30e-g	44.10c	42.20D
N ₁ K ₂	42.10c-e	45.20b	43.65BC	39.80ab	41.03ab	40.42A	45.30f	49.70bc	47.50B	41.67d-f	46.30b	43.98BC
N ₂ K ₀	35.73i	39.53fg	37.63E	33.30f	35.63d-f	34.47C	37.67i	41.13h	39.40E	38.60gh	40.13e-g	39.37E
N ₂ K ₁	40.63e-g	43.87b-d	42.25CD	37.60b-e	40.03ab	38.82AB	40.80h	46.37d-f	43.58CD	41.67d-f	46.73b	44.20BC
N ₂ K ₂	43.63b-d	48.53a	46.08A	38.03a-e	40.50ab	39.27AB	45.70ef	50.93b	48.32B	40.00c	50.53a	47.27A
Mean**	40.21B	42.72A	\bigvee	36.20B	38.53A	\bigvee	42.46B	46 90A	\bigvee	41.25B	44.42A	\bigvee

^{*} and ** reffer to specific effect of NK fertilization treatments and concentration of Za spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively,

Khalafalla (2000) on "Le-Conte" pear and "Anna" apple trees with regard to the influence of Zn foliar sprays on TSS/acid ratio.

IV-IV-2-4-Fruit tannins percentage

IV-IV-2-4-A- Specific effect

Regarding the fruit tannins percentage of both Costata and Hachyia persimmon cultivars in response to specific effect of the NK soil added rates, it is quite evident from Table (27) that a firm trend was obviously detected. Since, the lowest NK level (N_0K_0) added obviously recorded, the greatest fruit tannins percentage while, the opposite was true with the highest NK applied rate (N_2K_2) . Moreover, differences were significant between all investigated treatments of the NK added levels. Such trend was detected during both 1999 and 2000 seasons of study for both two cultivars (Costata and Hachyia) persimmon trees under this investigation.

As for the response to specific effect of zinc concentration in spray solution it was clear that fruit tannins % was generally decreased with spraying Zn at 200 ppm. Differences were significant as compared with the water sprayed trees (Zn_0 treatment). Such trend was true for both Costata and Hachyia persimmon cv. during both 1999 and 2000 seasons of study.

IV-IV-2-4-B- Interaction effect

Concerning the interaction effect resulted by the various combinations of the all investigated levels of both NK soil applied and Zn foliar spray solution, data in Table (27) revealed that specific effect of both factors under study reflected directly on their interaction effect. Hence, the combinations between the

			Costata	tata					Hachvia	ıvia		
Treatments		6661			2000			1999		1 18	2000	
	Zn o	Zn 1	Mean*	Zn	Zn i	NIean*	Zn	Zn:	Mean*	Zno	Zni	Mean*
No Ko	0.77a	0.63b	0.70A	0.83a	0.66b	0.74A	1.18a	1.00c	1.09A	1.07a	0.91c	0.99A
No K1	0.62c	0.58ef	0.60C	0.62d	0.60e	0.61B	0.94e	0.90gh	0.92D	0.83e	0.74h	0.79E
Ž. K.	0.58ef	0.55g	0.57E	0.61e	0.58fg	0.59C	0.88i	0.85j	0.86G	0.77g	0.70ij	0.74G
N Ko	0.64b	0.61cd	0.62B	0.64c	0.60e	0.62B	1,06b	0.99c	1.02B	0.93b	0.88d	0.90B
ZK	0.59de	175.0	0.58D	0.59ef	0.57g	0.58C	0.93f	0.90gh	0.91DE	0.87d	0.779	0.82D
Nı K2	0.57f	0.52h	0.55F	0.58fg	0.53h	0.55D	0.91fg	0.88hi	0.90F	0.80f	0.70ii	0.75F
N ₂ K ₀	0.55g	0.51hi	0.53G	0.61e	, 0.58fg	0.59C	1.00c	D.97d	0.98C	0.90c	0.84e	0.87C
N ₂ K ₁	0.50i	0.47j	0.49H	0.58fg	0.54h	0.56D	0.93f	0.91g	0.92D	0.80f	0.71i	0.75F
N ₂ K ₂	0.47j	0.48j	0.471	0.50i	0.48j	0,49E	0.93f	0.88i	0.90EF	0.77g	0.69	0.73G
Mean**	0.59A	0.55B	\bigvee	0.62A	0.57B	\bigvee	0.97A	0.92B	\bigvee	0.86A	0.77B	\langle

* and ** reffer to specific effect of NK fertilization treatments and concentration of Zn spray solution, respectively. Values obtained for the investigated characteristic in every

season were significantly distinguishing by capital and small letters for specific and interaction effects, respectively.

lowest NK soil applied rate (N_0K_0) from one hand and no zinc spray solution "water spray" from the other exhibited statistically the greatest fruit tannins % for both Costata and Hachyia persimmon cv. during the first and second seasons of study.

On the other hand, the lowest percentage of fruit tannins was always in concomitant to those Costata and Hachyia persimmon trees received the $(N_2K_2 \times Zn_1)$ followed by the $(N_2K_2 \times Zn_0)$ combinations. In addition, the other $(NK \times Zn)$ combinations came in between the aforesaid two extents with variable tendency of effectiveness.

RESULTS =