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EFFECT OF NITROGEN FORMS AND RATES ON CANTALOUPE (*Cucumis melo L.*) GROWN UNDER TRANSPARENT POLYETHYLENE LOW TUNNELS.

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ABSTRACT

Cantaloupe (*cucumis melo* L.) was transplanted at a private farm in El- Arish ,North Sinai Governorate during 2003/2004 and 2004/2005 seasons to investigate the effect of forms and rates of nitrogen fertilizers on cantaloupe growth and yield grown in sandy soil using drip irrigation .Split plot design was adopted using 3 forms of nitrogen i.e. ammonium sulphate, Enciabein, ((UFCU) urea formaldehyde coated urea) and ammonium nitrate (control)in the main plots .In the sub plots nitrogen rates of 80, 120 and 160 units per feddan, of nitrogen forms were applied.

Obtained results showed the superiority of ammonium sulphate followed by enciabein and ammonium nitrate as far vegetative growth and fruit yield characters. Using120 units of nitrogen per feddan of ammonium sulphate or 120 units nitrogen per feddan of enciabein (UFCU) increased leaves contents of N, P, k and some micronutrients than the other treatments. In addition, the above mentioned treatments improved the vegetative growth and fruit physical and chemical characters. Early and total yields were increased under ammonium sulphate at a rate of 120 units of nitrogen per feddan or 120 unit nitrogen of enciabein (UFCU) per feddan. The lowest vegetative growth, fruit and yield characters were obtained from the control (ammonium nitrate at a rate of 160 unit of nitrogen per feddan).

INTRODUCTION

Application of slow release fertilizers may eliminate the inefficiency of nitrogen application after planting and the risk of burning newly established plants with high pre- plant fertilizer application. *Bradly et al (1975)* reported that increasing the applied nitrogen dose in the form of urea formaldehyde increased yield and improved tomato fruit quality. In addition *Siegel and Vogt (1975)* mentioned that application of slow release nitrogen fertilizer at a rate of 115kg / ha. gave the highest fresh spinach yield. Single application of slow release nitrogen was studied by *Shelton (1976)* on tomato yield.The distribution of plant growth and yield was similar to those obtained with multiple 3-5 applications of ammonium sulphate which gave maximum yield production. *Aworth et al (1981)* indicated that application of ammonium nitrate at a rate of 168 and 448 kg/ha. to cantaloupe led to a gradual increment of fresh weight by increasing N levels.

Application of nitrogen fertilizers is very important for raising the production of vegetable crops. Several forms of nitrogen fertilizers are used now in Egypt, they include forms of nitrate, ammonium and urea. The high solubility and mobility of soluble nitrogen fertilizers in the soils are not always an advantage. Loss from such material was very high and ranged from 40 to 70% of that added to the soil *(Hegazy 1985).*

Many investigators studied the effect of nitrogen levels on plant growth ,number of leaves and yield of some vegetable crops. Also , *Abdel- Hadi et al (1985)* in their trials with different N fertilizers on potato crop, found that plant height was increased with increasing N levels. The greatest yield was obtained with urea followed by ammonium sulphate comparing with urea. Morever, *Shafshak (1987)* fertilized spinach plants with 20, 40, or 60 kg N /fed. and showed that number of leaves / plant , fresh and dry weight of leaves were significantly increased with increasing nitrogen (ammonium sulphate) level

Urea formaldehyde (UF) is prepared by reaction urea with formaldehyde linear and crosses. Linked polymers of varying the ratio of reactants commercial UF is mixture of reacted urea and short chain polymers with one, two or three methylene linkages. Bio degradation of UF apparently occurs at the C- bond rather than by hydrolysis (formaldehyde has not been detected in soil treated with UF). Once the initial degradation takes place, ammonification and nitrification proceed rapidly and crops unilize NO_2- N. Concerning N,P and K contents of plants *Lorenz et al (1988)* studied the effect of some nitrogen sources on potato yield and found that slow release fertilizer i.e. sulfur coated by urea gave raise to the greatest tuber yield compared with other sources urea. They reported also, that urea formaldehyde was the most effective in increasing yield. *Abdel-Azim (1988)* found that N content of lettuce was significantly increased with increasing N level up to 60 kg/ fed. and then decreased at higher N and P levels. Also, *Abou- Sedera et al (1989)* reported that total nitrogen content was increased steadily with increasing N – rate up to 90 kg N/feddan.

Leaching is reduced and the importance of the slow release fertilizer is diminished. A slow release N source with N correlated to the plant requirements may reduce the amount of N required to grow the crop as well as the amount leached*(Strelinkova 1986)*. Moreover, *Weier and Schorpf (1989)* indicated that lettuce yield was increased as the total available slow release nitrogen increased up to 135 kg/ha. .Also, *El- Fadaly and Mishriky (1990)* on cucumber, reported that increasing slow release N level from 0 up to 60 kg/fed. caused a gradual increment of fresh and dry weight / plant. Moreover, *El- Sirafy (1990)* indicated that potassium concentration in spinach plant was increased with raising N-fertilizer. *Humadi et al (1990)* added 0, 80, 160 and 240kg N /fed. as ammonium sulphate and found that total yield of cantaloupe was increased as N rate increased. Also, *Shafshak and Abou-Sedera (1990)* indicated that plant height increased with increasing N levels up to 90kg/ feddan in spinach plant.

In the last decade slow release nitrogen fertilizers have been developed with the objective of reducing leaching losses thus supplying N available for a more lasting period. In addition the controlled release fertilizer such as coated urea has been used in lower rate than urea or ammonium nitrate, it would significantly reduce the potential of ground water contamination by nitrate *(Johanson 1991)*. In addition, *Turner and Hummel (1992)* and *Albregts and Chandler (1993)* indicated that using 120 kg N / ha. slow released fertilizer in the form of (UFCU) increased vegetative growth of strawberry plants. *El-Asdoudi (1993)* on cucumber showed that in sandy soil

application of 50g per plant of slow release fertilizer gave the highest values on fruit length and fruit diameter, plant height, number of branches, number of leaves per plant and dry weight percentage of leaves. Moreover, *Abdel-Razik (1996)* found that soil application of slow release nitrogen fertilizer at a rate of 120kg N/ha. increased leaf area and number of leaves of cucumber plant. Also, *Baker and Gawish (1997)* and *Nasr- Alla et al (1998)* illustrated in pepper that highest yield and low nitrate can be achieved by fertilization with urea formaldehyde at a rate of 178.5 kg N/ha. Moreover, *Aziz and El-Ashry (2002)* found that increasing N levels from 20 to 40 kg N / fed. significantly increased total sugar and increasing levels to 60 kg N / fed. significantly increased yield, N, P and K contents in cantaloupe plants.

.Additionally, *Hasanin (2002)* reported that using 40 kg N / fed. in the form of Enciabein (UFCU) gave positive response in increasing fruit productivity and improved fruit quality of strawberry. Besides, *Abdel-Moneam (2004)* indicated that the application of 100gm N/kg soil as urea was superior than 200 or 300 mg N/kg soil as formaldehyde coated urea (FCU) for plant growth characters however, nitrogen application in two seasons of slow release nitrogen fertilizers at the same rate of 100gm N/kg soil was preferable to the other rates 200 or 300 mg N/kg soil as urea for dry weight percent. Spinach fertilized with urea formaldehyde coated urea tended to give the highest fresh and dry weight, higher number of leaves / plant, higher plant length and leaf area / plant compared with the control in spinach plants,

The aim of the present study was to investigate the effect of nitrogen fertilizer forms on cantaloupe, plant growth, yield and fruit quality.

MATERIAL AND METHOD

This research work was performed to study the interaction between the forms and rates of nitrogen fertilizers at El- Arish North Sinai Governorate during two successive seasons, i.e. 2003/2004 and 2004/ 2005. The experimental design was split plot with four replicates, having the forms of nitrogen fertilizers at random in the main plots and rates treatments were randomly distributed in the sub plots. Each sub plot had one row with dimensions of 20 m long, 1.8 m an width. Planting distance was 50 cm apart. Each sub plot includs 40 plants of the used cantaloupe hybrid. The used cantaloupe was Ideal F1 hybrid .Seed sowing was conducted on December 9th ,2003 and on December 11th ,2004 in the nursery. Seedling transplanting was performed on December 25th ,2003 and on December 29th ,2004 using clear polyethylene low tunnels.

Treatments:-

A- Main plot

1- Slow release fertilizer (Enciabein) (E)

2- Ammonium sulphate fertilizer (AS)

3- Ammonium nitrate fertilizer (AN)

B- Sub plot

1- Eighty of nitrogen unit from (E, AS and AN).

2- One hindered and twenty of nitrogen unit from (E, AS and AN).

3- One hindered and sixty of nitrogen from unit (E, AS and AN). (Control)

The trenches rows were filled with enciabein and ammonium sulphate while, ammonium nitrate was added through drip irrigation. Black polyethylene mulch and drip irrigation system were implemented before planting and each ridge which covered by clear polyethylene low tunnels of 80 micron in thickness. Fertigation and other cultural practices were applied as recommended by
Ministry of Agriculture. The soil analysis of the experimental soil were carried out at soil laboratory, Agriculture Research Center (ARC). Physical and chemical analysis of the soil are presented in Table (1)

Table (1) Some physical and chemical properties of the investigated soil.

2003/2004													
practical size distribution			Texture	PH	EC	OM	$CaCO_3$	mg/kg soil					
Sand	Silt	clay			Ds/m	%	%	N	P	K	Fe	Zn	Mn
96.3	2.1	1.6	Sandy	8.2	3.54	23.0	3.1	10.5	14.6	56.4	2.37	1.42	1.25
2004/2005													
97.3	1.8	0.9	Sandy	7.9	3.29	25.0	3.3	11.3	14.8	49.8	2.45	1.57	1.31

Determination of macro and micro elements content:-

1- Vegetative growth characteristics:

A random sample of five plants from each sub plot were taken after 90 days from transplanting to record the following characters:-

- Plant height (cm)

-Leaf area: the average leaf area (cm2) was measured for the 5^{th} true leaf by using laser leaf area meter.

- Number of leaves per plant.
- Fresh weight per plant.

2- Chemical composition

Sample of the fourth top leaves were dried at 70 ^{o} C till constant weight and wet digested to determine N, P and K contents.

- Total nitrogen (%) in leaves was determined by using the microkjeldahl by ***A. O. A. C. (1990).***

- Phosphorus (%)was determined calorimetrically at 550 mm as described by ***Ranganna (1979).***

- Potassium (%) was determined by flame photometer as described by ***Ranganna (1979).***

- Micro nutrients Fe, Zn and Mn contents were determined for the above ground dried vegetative parts by using atomic absorption spectrophotometer according to ***Chapman and pratt (1961).***

- Soluble Solid Content (SSC) of fruit was measured by hand refract meter.

- Total Sugar (TS) were determined (mg/100g fresh weight) by using ***A.O.A.C***. ***(1991).***

3- Fruit physical characteristics:

- Fruit length (cm) and fruit diameter (cm).
- Fruit firmness were determined according to ***Hiataranta and linna (1999).***
- Flesh thickness (cm).

4- Yield and its components:

- Early yield kg/ plant for the first two picking.
- Total yield kg/ plant.
- Average fruit weight (gm).
- Total yield ton/ fed.

Statistical analysis:

All obtained data were subjected to statistical analysis for variance by using split plot design as mentioned by ***Gomez and Gomez (1983)*** for calculating the least significant differences between treatments.

RESULTS AND DISCUSSION

1- Macro and micro nutrient of cantaloupe:-

a- Chemical analysis of cantaloupe plants:-

Results of N, P, K, Fe, Zn and Mn contents of cantaloupe cultivar leaves are presented in Table (2). Data show that (AS) treatment increased N, P ,K, Fe and Zn contents in leaves compared with (E) and (AN) treatments in the two seasons of study. Data in the same table show the effect of nitrogen rates on some macro and micro element contents of cantaloupe leaves. It is clear that adding nitrogen at a rate of 120 nitrogen unite increased significantly leaf content of N, P, K, Fe, Zn and Mn contents over any treatments used in both seasons of study .The lowest nutrient elements content were found in the control plants .Similar results were obtained by *Abdel- Azim (1988)* on lettuce, *Abou- Sedera et al (1989)* on tomato, *El- Sirafy (1990)* on spinach and *Aziz and El- Ashry (2002)* on cantaloupe.

Table (2) Effect of nitrogen forms and rates fertilizers on some macro and micro nutrient contents of cantaloupe leaves grown under transparent polyethylene low tunnels.

Constituents		2003/2004						2004/2005					
Main	Sub main	macro nutrients (%)			micro nutrients (ppm)			macro nutrients (%)			macro nutrients (ppm)		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
A	E	2.99	0.72	5.21	328	78	28	3.02	0.75	5.32	332	79	26
	AS	3.02	0.75	5.32	347	79	28	3.04	0.76	5.36	334	80	27
	AN	2.92	0.65	4.86	306	72	23	2.84	0.68	5.13	321	74	23
L.S.D.at 0.05		0.02	0.01	0.09	8.7	1.1	N.S	0.03	0.01	0.04	1.4	0.7	N.S
B	80	2.90	0.69	5.07	312	73	25	2.90	0.70	5.22	322	75	24
	120	3.25	0.86	5.65	376	87	34	3.32	0.84	5.63	353	87	32
	160	2.78	0.58	4.68	293	69	20	2.68	0.65	4.96	312	70	20
L.S.D.at 0.05		0.11	0.9	0.14	4.8	2.2	1.6	0.13	0.04	0.18	7.1	3.7	2.8

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

The lowest values of N, P and K contents were obtained from (AN) .As for the leaves content of micro nutrients i.e. Fe, Zn and Mn contents the data show that higher contents of the above mentioned elements were obtained from both nitrogen forms i. e.(AS and E) by adding 120 unite of nitrogen per feddan

b- Chemical analysis of cantaloupe fruits:-

The effect of different nitrogen forms and rates on macro and micro nutrients of cantaloupe fruits are shown in Table (4) .Results showed that application of ammonium sulphate at a rate of 120 nitrogen unites per feddan gave the highest values of N, Fe, Zn and Mn contents in cantaloupe fruits with significant differences compared with the enciabein and ammonium nitrate .Low concentration of macro and micro nutrient contents were observed at applying (E) and (AN).

Results of the interaction between nitrogen forms and rates on some macro and micro nutrients contents of cantaloupe leaves are presented in Table (3) .All nitrogen forms show higher N, P, K, Fe, Zn and Mn contents by adding 120 unite of nitrogen per feddan compared with other treatments.

Table (3) Effect of nitrogen forms and rates interaction on some macro and micro nutrient contents of cantaloupe plant leaves grown under transparent polyethylene low tunnels.

constituents		2003/2004						2004/2005					
Main	sub main	macro nutrients (%)			micro nutrients (ppm)			macro nutrients (%)			macro nutrients (ppm)		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
E	80	2.9	0.73	5.35	321	74	26	2.95	0.71	5.28	325	77	25
	120	3.24	0.82	5.83	353	87	34	3.31	0.84	5.62	351	86	31
	160	2.84	0.62	4.45	311	72	24	2.81	0.69	5.05	319	74	22
AS	80	3.05	0.76	5.31	333	77	30	3.17	0.78	5.46	332	78	29
	120	3.32	0.96	5.71	435	94	37	3.45	0.88	5.76	367	96	36
	160	2.69	0.52	4.95	273	65	17	2.49	0.61	4.85	302	65	18
AN	80	2.75	0.57	4.55	282	68	19	2.58	0.62	4.91	310	69	19
	120	3.18	0.80	5.40	341	79	31	3.21	0.79	5.52	340	80	28
	160	2.82	0.60	4.63	295	70	20	2.73	0.64	4.97	314	72	21
L.S.D.at 0.05		0.31	0.14	0.14	6.9	4.3	1.3	0.04	0.1	0.05	5.8	3.1	0.07

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

This result proved that applying (AS) and (E) at a rate of 120 N unites /fed. increased N, P, K, Fe, Zn and Mn contents of cantaloupe fruits during the studied seasons. As for phosphorus and potassium concentration the results showed that there were no significant difference between all treatments during the two seasons of study .As for nitrogen rates of the three treatments i, e, 80,120 and 160) N unites / fed., significant differences were detected in the concentration of N, P, K, Fe, Zn and Mn during the two successive studied seasons. The concentration of macro and micro elements in cantaloupe fruits showed that application of (AS) at a rate of 120 nitrogen unites per feddan gave significantly greater micro and macro element contents in the fruit compared with any other treatment used .These results were true in both seasons.

The interaction effect between the different nitrogen forms and rates on macro and micro elements of cantaloupe fruits are presented in Table (5) .Data showed that using ammonium sulphate at a rate of 120 unites of nitrogen per feddan increased N, P, K, Fe and Zn contents of cantaloupe

fruits with significant difference compared with the other treatments used and control. The lowest concentration of macro and micro elements fruit contents were observed with the treatment (AS) at a rate of 120 nitrogen unite per feddan .The results were similar for the two planting seasons. These results might be attributed to the simulative effect of nitrogen on the meristmatic activity of plant tissues since nitrogen is a constituent of proteins mucleic acid and many other important substances of plant cell. The results agreed with those obtained by *Strelinkova (1986) ,Johanson (1991)* and *Humadi et al (1990).*

Table (4) Effect of nitrogen forms and rates fertilizers on some macro and micro nutrient contents of cantaloupe fruits grown under transparent polyethylene low tunnels.

constituents		2003/2004						2004/2005					
Main	sub main	macro nutrients (%)			micro nutrients (ppm)			macro nutrients (%)			macro nutrients (ppm)		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
A	E	2.67	0.54	3.62	160	48	30	2.53	0.69	3.47	156	50	26
	AS	2.71	0.54	3.65	162	49	31	2.54	0.70	3.47	158	51	28
	AN	2.46	0.45	3.50	153	45	27	2.42	0.64	3.37	151	43	24
L.S.D.at 0.05		0.09	N.S	N.S	1.7	0.6	0.3	0.03	N.S	N.S	1.4	0.7	0.5
B	80	2.51	0.47	3.56	155	52	27	2.48	0.65	3.40	152	48	25
	120	3.01	0.65	3.82	174	55	36	2.66	0.78	3.65	170	60	34
	160	2.31	0.41	3.40	147	41	25	2.39	0.60	3.27	144	37	21
L.S.D.at 0.05		0.11	0.07	0.08	3.9	1.7	0.8	0.06	0.03	0.09	5.3	2.1	1.9

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

Table (5) Effect of nitrogen forms and rates interaction on some macro and micro nutrient contents of cantaloupe fruits grown under transparent polyethylene low tunnels.

constituents		2003/2004						2004/2005					
Main	sub main	macro nutrients (%)			micro nutrients (ppm)			macro nutrients (%)			macro nutrients (ppm)		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
E	80	2.50	0.66	3.42	153	50	26	2.54	0.50	3.61	157	47	27
	120	2.67	0.77	3.65	171	58	34	3.05	0.65	3.81	173	54	37
	160	2.43	0.63	3.34	145	42	24	2.41	0.47	3.45	150	42	26
AS	80	2.56	0.70	3.53	159	53	28	2.72	0.55	3.69	162	49	31
	120	2.72	0.84	3.72	176	67	37	3.21	0.74	3.94	182	59	39
	160	2.35	0.56	3.17	140	33	19	2.19	0.34	3.33	142	39	23
AN	80	2.37	0.58	3.24	144	35	20	2.27	0.37	3.37	145	41	24
	120	2.60	0.74	3.58	164	56	30	2.78	0.57	3.72	167	51	33
	160	2.40	0.60	3.30	146	37	22	2.32	0.41	3.41	148	42	25
L.S.D.at 0.05		0.06	0.01	0.03	2.4	1.7	N.S	0.04	0.02	0.04	3.1	1.1	N.S

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

2- Vegetative growth of cantaloupe plant grown under transparent polyethylene low tunnels.

Ammonium sulphate gave significantly greater plant height ,leaf area , number of leaves per plant and fresh weight than enciabein or ammonium nitrate with significant differences during the two seasons. The dry weight per

plant showed no significant differences in this concern between the used treatments during the two seasons(Table6). As for the effect of nitrogen rates results in Table (6) showed that applying (AS) at a rate of 120 unites of nitrogen per feddan increased plant height , leaf area , number of leaves fresh and dry weight than the other rates with significant differences. The lowest vegetative growth was obtained from control (ammonium nitrate) at a rate of 160 unite nitrogen per feddan .Application of slow release fertilizers (enciabein) can eliminate the inefficiency of nitrogen application after planting. The data are in harmony with those obtained by *Aworth et al (1981), Abdel- Hadi et al (1985), Hagazy (1985) ,Shafshak (1987)* and *Nasr- alla et al (1998)*

Table (6) Effect of nitrogen forms and rates on vegetative growth of cantaloupe plant leaves grown under transparent polyethylene low tunnels.

constituents		2003/2004					2004/2005				
main	sub main	plant height (cm)	Leaf Area (cm^2)	No of leaves/ plant	fresh weight/ plant (g)	Dry weight/ plant (g)	Plant height (cm)	Leaf Area (cm^2)	No of leaves/ plant	Fresh weight/ plant (g)	Dry weight/ plant (g)
A	E	121.5	177.7	54.0	117.0	11.6	121.0	175.5	56.3	120.3	11.9
	AS	123.6	180.1	56.0	118.7	11.6	122.1	176.2	57.3	121.5	12.0
	AN	117.1	170.7	49.7	110.8	11.2	115.7	167.7	52.7	115.4	11.5
L.S.D.at 0.05		1.2	2.8	0.9	0.7	N.S	0.6	0.6	0.4	0.3	N.S
B	80	117.4	173.7	50.0	112.2	11.4	116.7	169.4	53.3	116.3	11.5
	120	131.3	191.3	65.7	127.7	12.2	129.5	188.4	63.3	129.8	12.8
	160	113.5	163.8	46.0	106.7	10.8	112.7	161.7	49.7	110.8	11.1
L.S.D.at 0.05		2.4	7.1	3.7	3.3	0.2	2.1	5.3	1.8	4.6	0.3

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

The interaction of nitrogen forms and rates on vegetative growth are presented in Table (7) .Results showed that applying 120 unites of nitrogen per feddan increased the vegetative growth by ammonium sulphate .The values of plant height , leaf area , number of leaves fresh and dry weight were significantly greater than the other treatments during the two studied seasons. The response of the enciabein to the nitrogen rates was similar to the ammonium sulphate which was applying 120 N unite / feddan. The lowest vegetative growth of the three forms was obtained from the control (AN) at a rate of 160 unite nitrogen per feddan during the two studied seasons

Form the above mentioned results it can be concluded that applying 120 N unite fed. of ammonium sulphate increased the vegetative growth compared with the other treatments and control .The data agreed with those reported by *El-Fadaly and Mishriky (1990) ,Shafshak and Abou-Sedera(1990), Turner and Hummel (1992) , Albergts and Chandler (1993), Abdel- Razik (1996)* and *Abdel- Moneam(2004).*

Table (7) Effect of nitrogen forms and rates interaction on vegetative growth of cantaloupe plants leaves grown under transparent polyethylene low tunnels.

Constituents		2003/2004					2004/2005				
Main	sub main	plant height (cm)	leaf area (cm^2)	No. of leaves /plant	fresh weight/ plant (g)	dry weight/ plant (g)	Plant height (cm)	leaf area (cm^2)	No. of leaves /plant	Fresh weight/ plant (g)	Dry weight/ plant (g)
E	80	117.4	176.2	52	114.6	11.6	118.6	171.6	54	117.3	11.7
	120	131.6	190.3	66	125.6	12.0	129.4	188.2	63	130.1	12.6
	160	115.4	166.7	50	110.8	11.1	115.1	166.8	52	113.6	11.4
AS	80	122.6	181.6	56	117.8	11.7	121.1	178.4	58	121.6	12.0
	120	137.8	198.4	70	136.8	12.7	135.4	193.3	67	132.6	13.4
	160	110.6	160.4	42	101.6	10.5	109.8	156.9	47	108.6	10.7
AN	80	112.3	163.4	42	104.2	10.8	110.3	158.1	48	109.4	10.9
	120	124.5	184.5	61	120.6	11.9	123.6	183.6	60	126.7	12.5
	160	114.5	164.3	46	107.6	10.9	113.1	161.4	50	110.1	11.1
L.S.D.at0.05		1.4	5.9	2.7	2.6	0.5	3.1	4.7	4.2	3.9	0.3

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

3- Physical characteristics of cantaloupe fruits grown under transparent polyethylene low tunnels.

Table (8) show the effect of nitrogen forms and rates on fruit characteristics of cantaloupe fruits grown under low tunnels .It is clear that application of (AS) resulted in higher values of fruit length, fruit firmness, TS and SSC than the other used treatments with significant differences during the two studied seasons .Fruit diameter and flesh thickness did not differ significantly due to the application of any treatment used in different N forms of this study in both seasons.

Table (8) Effect of nitrogen forms and rates fertilizers on physical characteristics of cantaloupe plants leaves grown under transparent polyethylene low tunnels.

Constituents		2003/2004						
Main	sub main	fruit length (cm)	fruit diameter (cm)	L/D ratio	Fruit firmness (g/cm^2)	flesh thickness (cm)	TS mg/100g (f.w.)	SSC %
A	E	13.4	12.8	1.06	75.7	3.1	74.90	14.5
	AS	13.5	12.8	1.06	77.9	3.1	75.30	14.7
	AN	13.1	12.2	1.07	72.2	2.8	71.6	14.1
L.S.D.at 0.05		0.3	N.S	N.S	1.2	N.S	0.8	0.2
B	80	13.1	12.3	1.07	72.6	2.9	72.50	14.2
	120	14.2	13.8	1.05	80.7	3.5	80.10	15.0
	160	12.7	11.8	1.07	70.4	2.6	69.20	13.9
L.S.D.at0.05		0.4	0.1	N.S	3.5	0.2	2.8	0.3
2004/2005								
A	E	12.8	12.1	1.06	73.9	3.0	74.40	14.1
	AS	13.0	12.1	1.07	76.9	3.1	74.80	14.2
	AN	12.4	11.6	1.04	67.8	2.8	70.50	13.8
L.S.D.at 0.05		0.3	N.S	N.S	0.9	N.S	0.5	0.1
B	80	12.4	11.8	1.05	69.4	2.8	71.30	13.8
	120	13.8	12.8	1.08	83.3	3.3	81.20	14.8
	160	11.9	11.2	1.06	62.9	2.6	67.10	13.5
L.S.D.at0.05		0.5	0.4	N.S	5.4	0.3	3.6	0.2

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

Concerning nitrogen rates the results indicated that adding ammonium sulphate at a rate of 120 unites of nitrogen per feddan increased fruit length ,fruit diameter, fruit firmness ,flesh thickness, TS and SSC compared with the control. The results were conformed in the two season and agreed with those obtained *Bradly et al (1975), El- Asdoudi (1993)* and *Aziz and El-Ashry (2002)* .The lowest physical fruit values were obtained from the control (ammonium nitrate) during the two studied seasons.

From the mentioned results it can be concluded that the physical fruit characteristics of the ammonium sulphate was higher than the other treatments during the two seasons 2003/2004 and 2004/2005.

The results of the interaction between nitrogen forms and rates on the physical fruit characteristics are presented in Table (9). Data show that the physical fruit characteristics for the three nitrogen forms were increased by applying 120 unites of nitrogen per feddan of ammonium sulphate or enciabein .From the mentioned results it can be concluded that the physical fruit characteristics were significantly increased by adding ammonium sulphate at a rate of 120 unites of N/ fed. .The importance of the slow release fertilizer is related to reduced leaching. Slow release N source with an N release rate correlated to the plant requirements may reduce the amount needed to grow the crop as well as the leached amount .Data were in harmony with those *Hasanin(2002).*

Table (9) Effect of nitrogen forms and rates interaction on physical characteristics of cantaloupe plants leaves grown under transparent polyethylene low tunnels.

Constituents		2003/2004						
main	sub main	fruit length (cm)	fruit diameter (cm)	L/D ratio	Fruit firmness (g/cm²)	Flesh thickness (cm)	TS mg/100g (f.w.)	SSC %
E	80	13.1	12.4	1.06	73.90	3.0	73.80	14.3
	120	14.2	14.1	1.05	80.60	3.5	80.40	15.0
	160	12.8	12.0	1.07	72.60	2.8	70.40	14.1
AS	80	13.5	12.8	1.06	75.20	3.1	75.60	14.4
	120	14.6	14.1	1.04	84.00	3.7	82.70	15.3
	160	12.5	11.6	1.08	68.30	2.4	67.70	13.7
AN	80	12.6	11.7	1.08	68.80	2.5	68.20	13.8
	120	13.9	13.1	1.06	77.40	3.2	77.20	14.7
	160	12.7	11.9	1.07	70.30	2.6	69.40	13.9
L.S.D.at0.05		0.3	0.2	0.01	3.2	0.3	2.4	0.4
2004/2005								
E	80	12.5	12.1	1.03	71.30	2.8	72.60	13.9
	120	13.8	12.7	1.09	83.30	3.6	81.20	14.8
	160	12.1	11.5	1.05	67.20	2.7	69.40	13.7
AS	80	12.9	12.3	1.05	76.10	3.1	75.30	14.2
	120	14.3	13.2	1.08	87.30	3.9	84.30	15.1
	160	11.7	10.9	1.07	58.40	2.4	64.70	13.3
AN	80	11.8	11.1	1.06	60.70	2.5	66.10	13.4
	120	13.4	12.4	1.08	79.40	3.4	78.10	14.4
	160	11.9	11.3	1.05	63.20	2.6	67.20	13.5
L.S.D.at0.05		0.2	0.4	0.02	5.9	0.1	1.7	0.6

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

4- The effect of nitrogen forms and rates on yield of cantaloupe fruits grown under transparent polyethylene low tunnels.

Early yield ,total yield and average fruit weight of cantaloupe fruit as influenced by different nitrogen forms and rates are presented in Table (10).Data reveal that ammonium sulphate gave significantly higher early , total yield , average fruit weight and total yield per feddan under 120 unites of N/ fed. than all other treatments used in both seasons .This result may be due to the efficiency of ammonium sulphate on cantaloupe plants.

The lowest early and total yield were obtained from the control i, e, the ammonium nitrate at a rate of 160 nitrogen unites per feddan. Similar results have been found by *Bradly et al (1975), Siegel and Vogt (1975) ,Shelton (1976), Lorenz et al (1988), Weier and Schorpf (1989)* and *Baker and Gawish (1997).* Concerning interaction of nitrogen forms and rates data reveal that the three nitrogen forms gave high early and total yield under 120 unites of nitrogen per feddan of ammonium sulphate with significant difference between them and all other used treatments Table (11).

Table (10) Effect of nitrogen forms and rates fertilizers on yield productivity of cantaloupe plants leaves grown under transparent polyethylene low tunnels.

Constituents		2003/2004				2004/2005			
main	sub main	early yield/ plant (kg)	total yield/ plant (kg)	average fruit weight (g)	total yield/ fed .(ton)	Early yield/ Plant (kg)	total yield/ plant (kg)	Average fruit weight (g)	total yield/ fed. (ton)
A	E	2.9	6.9	755	16.3	3.0	6.8	764	17.63
	AS	3.0	7.0	764	16.9	3.3	6.9	773	17.75
	AN	2.5	6.5	72.0	15.4	2.7	6.5	717	17.03
L.S.D.at 0.05		0.7	0.3	6.3	0.5	0.2	0.1	4.9	0.09
B	80	2.5	6.6	712	15.42	2.8	6.6	722	17.12
	120	3.7	7.7	851	19.08	3.4	7.4	859	18.85
	160	2.1	6.2	677	14.13	2.6	6.2	673	16.45
L.S.D.at 0.05		0.2	0.3	11.2	0.28	0.3	0.3	18.4	0.17

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

Table (11) Effect of forms of nitrogen fertilizers and rates interaction on yield productivity of cantaloupe plants leaves grown under transparent polyethylene low tunnels.

constituents		2003/2004				2004/2005			
main	sub main	early yield/ plant (kg)	total yield/ plant (kg)	average fruit weight (g)	total yield/ fed .(ton)	Early yield/ Plant (kg)	total yield/ plant (kg)	average fruit weight (g)	total yield/ fed. (ton)
E	80	2.6	6.7	715	15.50	2.9	6.7	735	17.35
	120	3.7	7.6	852	19.00	3.4	7.4	862	18.75
	160	2.4	6.5	700	14.50	2.7	6.3	695	16.80
AS	80	3.0	7.1	761	16.75	3.0	7.0	770	17.75
	120	4.1	8.1	880	20.25	3.7	7.8	900	19.50
	160	1.8	5.8	650	13.70	2.2	6.0	653	16.00
AN	80	2.0	6.0	660	14.00	2.5	6.1	664	16.25
	120	3.4	7.4	820	18.00	3.1	7.1	815	18.30
	160	2.1	6.2	680	14.20	2.6	6.2	675	16.55
L.S.D.at 0.05		0.4	0.3	8.7	0.02	0.2	0.1	6.1	0.09

(E)= slow release fertilizer (enciabein) (AS) =ammonium sulphate (AN) =ammonium nitrate

Application of nitrogen fertilizers is most important for raising the production of vegetable crops. Several forms of nitrogen fertilizers are used in Egypt .The nitrate, ammonium and urea. The high solubility and mobility of soluble nitrogen fertilizers in the soils are not always an advantage. It can be concluded that application of nitrogen in the form of ammonium sulphate at the rate of 120 units of nitrogen would be the most promising treatment for increasing productivity and quality of cantaloupe. Such data confirmed those recorded by *Aziz and Ashry (2002), Hasanin (2002)* and *Abdel –Moneam (2004)*.

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تاثير استخدام صور ومعدلات النتروجين على انتاجية ومواصفات جودة ثمار الكنتالوب المنزرعة تحت الانفاق البلاستيكية المنخفضة.

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اجريت الدراسة خلال مواسم 2003/ 2004 و2004/ 2005 قى منطقة العريش – محافظة شمال سيناء لدراسة تاثير 3 صور للنتروجين وهى سلفات الامونيوم والانسيابين (سماد نتروجينى بطئ التحلل) ونترات الامونيوم باستخدام ثلاث مستويات وهى 80و120و160 وحدة نتروجين لكل فدان لكلا منهما وكانت المعاملات كالاتى:-

1- سلفات الامونيوم (ثلاث مستويات 80و120و160 وحدة نتروجين لكل فدان).
2- الانسيابين (ثلاث مستويات 80و120و160 وحدة نتروجين لكل فدان).
3- نترات الامونيوم (ثلاث مستويات 80و120و160 وحدة نتروجين لكل فدان).

وكانت اهم النتائج المتحصل عليها:-

1- ادى استخدام السماد النتروجينى سلفات الامونيوم بمعدل 120 وحدة نتروجين لكل فدان الى زيادة محتوى الاوراق من العناصر الكبرى N ,P K وبعض العناصر الصغرى Fe, Mn, Zn مقارنة بالمعاملات الاخرى.
2- ك ادى استخدام السماد النتروجينى سلفات الامونيوم او الانسيابين بمعدل 120 وحدة نتروجين لكل فدان الى زيادة النمو الخضرى والصفات الكيماوية والطبيعية.
3- ادى استخدام المعدل 120 وحدة نتروجين لكل فدان من استخدام السماد النتروجينى سلفات الامونيوم الى زيادة كلا من المحصول المبكر والكلى ومتوسط وزن الثمرة.
4- كان اقل نمو خضرى و والصفات الكيماوية والطبيعية و المحصول المبكر والكلى ومتوسط وزن الثمرة عندما تم استخدام السماد النتروجينى نترات الامونيوم (الكنترول) بمعدل 160 وحدة نتروجين لكل فدان.