IV- RESULTS AND DISCUSSION

IV RESULTS AND DISCUSSION

IV.1. PHYNOLOGICAL PHASES RESPONSE.

IV.1.1 Time of Budburst.

From Tables (1 and 2) it is clear that all Dormex (hydrogen cyanamide) treatments regardless of spraying date and used concentration advanced the begining of budburst in comparsion with the control and other treatments. This was clear in both studied seasons.Also the early spraying (15 December and Januarry first) was always more effective than the later spraying (15 January and February first). The earliness of budburst depended of upon the concentration and date of spraying ranged from 65 to 7 days, during the first season and from 66 to 10 days in the second seson . Moreover it cluld be concluded that the earlier application and higher concentration of Dormex (H_2CN_2) (2.5 and 5 %) was more effective in this respect

The obtained results were in agreement with the previously reported by many investigators working on several grape clutivars *(Iwasaky 1980,Shulman et. al. 1983, Bracho et. al. 1985, Burnett 1985, Smitt 1985, Sabry 1992, Ghobrial and Abdel-Fattah 1993b, Sourial et. al. 1993 and Abdel-All 1996).*

Mean while spraying KNO_3 at 5 % and urea at 10 % enhanced budburst slightly in comparison to control with not more than 6 days during the two studied seasons. On the other hand treated vines with GA_3 at low concentration (50 ppm) or higher concentration (1000 ppm) and NAA at 25 and 250 ppm and zinc sulphate at 25 % delayed the date of budburst than the control. Furthermore GA_3 at low and high

Table (1) : Effect of some growth regulators and nutrient elements on the begining of budburst of Thompson Seedless grapevines during 1993/1994 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	15/3	15/3	15/3	15/3				
H_2CN_2 1.25%	14/1	29/1	17/2	8/3	* - 59	- 45	- 26	- 7
$H_2 CN_2$ 2.5%	10/1	15/1	12/2	27/2	- 63	- 49	- 31	- 16
H_2CN_2 5.0%	8/1	22/1	9/2	25/2	- 65	- 52	- 24	- 18
GA_3 50 ppm	25/3	27/3	20/3	21/3	** + 10	+ 12	+ 5	+ 6
GA_3 1000 ppm	22/3	27/3	18/3	19/3	+ 7	+ 12	+ 3	+ 4
NAA 25 ppm	16/3	18/3	22/3	23/3	+ 1	+ 3	+ 7	+ 8
NAA 250 ppm	17/3	16/3	23/3	29/3	+ 2	+ 1	+ 8	+ 14
KNO_3 5%	12/3	13/2	10/3	10/3	- 3	- 2	- 5	- 5
Zn SO_4 25%	20/3	19/3	18/3	18/3	+ 5	+ 4	+1	+3
Urea 10 %	14/3	13/3	12/3	10/3	-1	-2	-3	-5

* - Number of earling days than the control .

** + Number of delaying days than the control .

Table (2): Effect of some growth regulators and nutrient elements on the begining of budburst of Thompson Seedless grapevines during 1994/1995 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	10/3	10/3	10/3	10/3				
H_2CN_2 1.25%	8/1	24/1	11/2	28/2	* - 61	- 45	- 27	- 10
$H_2 CN_2$ 2.5%	5/1	21/1	6/2	22/2	- 64	- 48	- 32	- 16
H_2CN_2 5.0%	3/1	20/1	5/2	20/2	- 66	- 49	- 33	- 18
GA_3 50 ppm	21/3	23/3	16/3	16/3	** + 11	+ 13	+ 6	+ 6
GA_3 1000 ppm	20/3	20/3	12/3	15/3	+10	+10	+2	+5
NAA 25 ppm	13/3	14/3	17/3	18/3	+3	+4	+7	+8
NAA 250 ppm	15/3	13/3	14/3	23/3	+5	+3	+4	+13
KNO_3 5%	6/3	8/3	4/3	5/3	-4	-2	-6	-5
Zn $SO_4$25%	17/3	15/3	14/3	13/3	+7	+5	+4	+3
Urea 10 %	8/3	9/3	6/3	7/3	-2	-1	-4	-3

* - Number of earling days than the control .

** + Number of delaying days than the control .

concentrations and NAA at high concentration (250 ppm) gave the latest budburst, since this treatments delayed the budburst by about 10 to 14 days than the control. Moreover the more effective spraying date in delaying budburst was on January first for GA_3 and on February first for NAA at high concentration this was true for both studied seasons.

These results are in agreement with the findings of ***Weaver et. al. (1961)*** who indicated that GA_3 at high concentration delayed budburst of grapes.

Also Iwasaky (1981) reported that bud dormancy of grapes was markedly prolonged by GA_3 application.

Moreover the same results were reported by ***El-Shahat (1992)*** who found that application of GA_3 at 500 ppm and zinc sulphate at 20 % after pruning at dormant season delayed budburst of Thompson seedless grapevines up to 10 and 4 days respectively.

Furthermore Nigond (1960) found that spraying grapevines with NAA at 15 January and 25 February delayed budburst by about 2 and 16 days.

IV.1.2.Time of Blooming.

The data in Tables (3 and 4) indicated that the most effective agents in earling blooming date was Dormex (hydrogen cyanamide) ; Regardless of the used concentration, the early hydrogen cyanamide application was the more effective in this respect during the two studied seasons.

Table (3) : Effect of some growth regulators and nutrient elements on the begining of blooming of Seedless grapevines during 1993/1994 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	30/4	30/4	30/4	30/4				
H_2CN_2 1.25%	20/3	15/4	8/4	20/4	* - 41	-15	-22	-10
$H_2 CN_2$ 2.5%	15/3	10/4	4/4	12/4	- 46	-20	-26	-18
H_2CN_2 5.0%	10/3	8/4	3/4	9/4	-51	-22	-27	-21
GA_3 50 ppm	9/5	10/5	5/5	5/5	** + 9	+10	+5	+5
GA_3 1000 ppm	6/5	13/5	5/5	30/4	+6	+13	+5	0
NAA 25 ppm	2/5	30/4	7/5	6/5	+2	0	+7	+6
NAA 250 ppm	5/3	5/5	6/5	10/5	+3	+5	+6	+10
KNO_3 5%	24/4	26/4	22/4	23/4	-6	-4	-8	-7
Zn SO_4 25%	8/5	9/5	30/4	1/5	+8	+9	0	+1
Urea 10 %	25/4	25/4	20/4	17/4	-5	-5	-10	-13

* - Number of earling days than the control .

** + Number of delaying days than the control .

Table (4) : Effect of some growth regulators and nutrient elements on the begining of blooming of Thompson Seedless grapevines during 1994/1995 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	26/4	26/4	26/4	26/4				
H_2CN_2 1.25%	25/3	21/3	26/3	10/4	* - 32	- 36	- 31	- 16
$H_2 CN_2$ 2.5%	19/3	16/3	21/3	7/4	- 38	- 41	- 36	- 19
H_2CN_2 5.0%	18/3	14/3	20/3	5/4	- 39	- 43	- 37	- 21
GA_3 50 ppm	3/5	29/4	30/4	1/5	** + 7	+3	+3	+5
GA_3 1000 ppm	4/5	27/4	27/4	27/4	+8	+1	+1	+1
NAA 25 ppm	27/4	28/4	3/5	3/5	+ 1	+2	+7	+7
NAA 250 ppm	29/4	28/4	2/5	9/5	+3	+2	+6	+13
KNO_3 5%	16/4	18/4	19/4	21/4	-10	-8	-7	-5
$Zn SO_4$ 25%	7/5	27/4	28/4	26/4	+11	+1	+2	0
Urea 10 %	12/4	12/4	16/4	16/4	-14	-14	-10	-18

* - Number of earling days than the control .

** + Number of delaying days than the control .

The earliness in time of blooming at the early application of hydrogen cyanamide at 15 December ranged from 41 to 51 and 32 to 39 days in the first and second seasons respectively while in the later application (15 January and February first) were from 10 to 21 days and 16 to 21 days in the first and the second seasons respectively in comparsion with the control. Potassium nitrate at 5 % also advanced blooming but to a limited extent ranged from 4 to 10 days during the two seasons of study in comparison with the control.

Furthermore urea at 10 % advanced blooming date from 5 to 13 days and from 10 to 18 days in comparison with the control during the first and second seasons of study respectively.

On the other hand the application of GA_3 and zinc sulphate at the two early dates (15 December and January first) of spraying and NAA at the two later one delayed the date of blooming in comparison with the control regardless the used concentration. The obtained results are in line with the findings of ***Jordan (1985 and 1986), Mc Coll (1986)*** and ***Sourial et. al. (1993)*** , who found that spraying grapevines with hydrogen cyanamide advanced blooming date. ***While Sony and Youssif (1978)*** reported that spraying apricot trees with GA_3 delayed blooming by 13-5 days.

IV.1.3.Time of Begining of Ripening Stage (Veraison).

From Tables (5 and 6) it clould be noticed that all tested Dormex (hydrogen cyanamide) treatments regardless of the cocnentration and the date of spraying advanced the begining of ripening stage in

compsrison with other treatments and control in both seasons of investigation.

Generally the application on Feb.1st was more effective in this respect than spraying on 15 Dec. and January 1st this was true in both seasons of study.

Concening the effect of urea data shwed atat spraying Thompson Seedless grapevines with 10 % urea advanced the Veraison by 5 days in the first and second seasons of study.

Also spraying KNO_3 at 5 % on 15 January and February first only advanced Veraison by 10 to 5 days in comparson with control in both seasons of study with all dates of applications.

On the other hand application of GA3 at low (50 ppm and hgih 1000 ppm) concentration delayed Veraison by 15-5days depending upon the spraying date in comparison with the control during the two seasons of study while treating grapevines with NAA at low and high concentrations (25 and 250 ppm) on 15 Jan. and Feb. first in the second season-only delayed Veraison than the control.

Also zinc sulphate at 25 % delayed the Veraison by 5 and 10 days during the two seasons of study respectively in comparison with the control.

Table (5) : Effect of some growth regulators and nutrient elements on the begining of ripening (Veraison) of Thompson Seedless grapevines during 1993/1994 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	15/6	15/6	15/6	15/6				
H_2CN_2 1.25%	30/5	5/6	25/5	30/5	* - 16	- 10	- 21	- 15
$H_2 CN_2$ 2.5%	30/5	5/6	25/5	25/5	- 16	- 10	- 21	- 20
H_2CN_2 5.0%	30/5	5/6	25/5	25/5	-16	-10	-21	-20
GA_3 50 ppm	25/6	25/6	20/6	15/6	** + 10	+10	+5	0
GA_3 1000 ppm	20/6	20/6	20/6	15/6	+5	+5	+5	0
NAA 25 ppm	15/6	15/6	20/6	20/6	0	0	+5	+5
NAA 250 ppm	15/6	15/6	20/6	15/6	0	0	+5	0
KNO_3 5%	10/6	10/6	10/6	10/6	-5	-5	-5	-5
Zn SO_4 25%	20/6	20/6	15/6	15/6	+5	+5	0	0
Urea 10 %	15/6	10/6	10/6	10/6	0	-5	-5	-5

* - Number of earling days than the control .

** + Number of delaying days than the control .

Table (6) : Effect of some growth regulators and nutrient elements on the begining of ripening (Veraison) of Thompson Seedless grapevines during 1994/1995 season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	10/6	10/6	10/6	10/6				
H_2CN_2 1.25%	30/5	30/5	30/5	25/5	* - 11	-11	-11	-16
$H_2 CN_2$ 2.5%	25/5	25/5	25/5	25/5	- 16	- 16	- 16	- 16
H_2CN_2 5.0%	30/5	25/5	30/5	25/5	-11	-16	-11	-16
GA_3 50 ppm	20/6	20/6	25/6	15/6	** + 10	+10	+15	+5
GA_3 1000 ppm	15/6	15/6	25/6	15/6	+5	+5	+15	+5
NAA 25 ppm	10/6	15/6	25/6	20/6	+10	+5	+15	+10
NAA 250 ppm	10/6	15/6	25/6	20/6	+10	+5	+15	+10
KNO_3 5%	5/6	30/5	5/6	30/5	-5	-10	-5	-10
Zn SO_4 25%	20/6	15/6	20/6	20/6	+10	+5	+10	+10
Urea 10 %	5/6	5/6	5/6	5/6	-5	-5	-5	-5

* - Number of earling days than the control .

** + Number of delaying days than the control .

VI.1.4. Time of Harvesting

Data in Tables (7 and 8) showed that Dormex (hydrogen cyanamide) was more effective agent in advancing time of harvesting Thompson Seedless grape, regardless of the date of spraying or the concentration used

The number of early days ranged from 20 to 30 days in two seasons of study in comparison with the control.

Many investigators working on grapevines clarified the beneficaial effect of Dormex (hydrogen cyanamide) in advancing berry ripening and consequently harvesting.

Furthermore the application of Dormex (hydrogen cyanamide) on January first and 15 January was more effective in advancing harvesting date in the first season than the application on 15 Decembr and the later one at February first.

Spraying grapevines with urea at 10 % after pruning at dormancy also advanced harvesting by 10-5 days in the first season and by 15 to 10 days in the second season. Furthermore later two spraying dates (at 15 January and Feb. first). of urea was more effective in advancing harvesting than two earlier spraying date (15 December and January first), during two seasons o study.

The same results were obtained by spraying KNO_3 at 5 % at 15 January and Feb. first, both advanced harvesting date by 15-10 days in the first season and by 20 and 15 days in the second season in comparison with the control.

Concerning the effect of GA_3 application the obtained results showed that spraying Thompson Seedless grapevines with GA_3 at low and high (50 and 1000 ppm) concentration delayed harvesting time by 5-10 days than the control during the two seasons of study, the more effective spraying dates in this respect are at 1 and 15 January.

Also treatment with NAA at low and high (25 and 250 ppm) concentration delayed harvesting date by 10-5 days in the first season while had no differences in this respect in the second season.

Furthermroe zinc sulphate nearly had the same trend of NAA in this respect.

Generally the obtained results concerning the effect of some growth regulators and nutrient elements on phynological phases of Thompson Seedless grape cultivar revealed that if the grower aim to obtain early high priced yields, he has to apply hydrogen cyanamide (at 2.5 and 5.0 % Dormex) during January, followed by urea at 10 % and KNO_3 at 5 % during 15 January and February first. While if the aim to delayed the budburst to avoid Spring frost, he has to apply GA_3 at 50 ppm at January 1st and NAA at 250 ppm at February first. While if the aim to delayed the budburst to avoid spring frost, he has to apply GA_3 at 50 ppm at January 1st and NAA at 250 ppm at February first which delayed budburst up to 13 and 14 days than control respectively.

Also generally the obtained results concerning the effect of Dormex (hydrogen cyanamide) on phynological phases of Thompson Seedless are in line with privous investigation by ***Line (1987), Shulman et. al. (1983) Lin et. al. (1985) , Smitt (1985), Mc Coll***

Table (7) : Effect of some growth regulators and nutrient elements on the harvesting date of Thompson Seedless grapevines during 1993/1994 Season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	15/7	15/7	15/7	15/7				
H_2CN_2 1.25%	25/6	20/6	20/6	20/6	* - 20	-25	-25	-25
$H_2 CN_2$ 2.5%	25/6	25/6	20/6	15/6	-20	-20	-25	-30
H_2CN_2 5.0%	25/6	25/6	25/6	15/6	-20	-20	-20	-30
GA_3 50 ppm	25/7	25/7	25/7	20/7	** + 10	+10	+10	5
GA_3 1000 ppm	20/7	20/7	20/7	15/7	+5	+5	+5	0
NAA 25 ppm	20/7	15/7	25/7	20/7	+5	0	+10	+5
NAA 250 ppm	20/7	15/7	20/7	20/7	+5	0	+5	+5
KNO_3 5%	5/7	10/7	30/6	5/7	-10	-5	-15	-10
Zn SO_4 25%	10/7	20/7	15/7	15/7	+5	+5	0	0
Urea 10 %	10/7	5/7	5/7	5/7	-5	-10	-10	-10

* - Number of earling days than the control .

** + Number of delaying days than the control .

Table (8) : Effect of some growth regulators and nutrient elements on the harvesting date of Thompson Seedless grapevines during 1994/1995 Season.

Treatments \ Date of spraying	Date				Earling or delaying days than the control			
	15/12	1/1	15/1	1/2	15/12	1/1	15/1	1/2
Control	10/7	10/7	10/7	10/7				
H_2CN_2 1.25%	15/6	20/6	15/6	15/6	* - 25	-20	-25	-25
$H_2 CN_2$ 2.5%	15/6	20/6	15/6	10/6	-25	-20	-20	-30
H_2CN_2 5.0%	15/6	20/6	15/6	10/6	-25	-20	-25	-30
GA_3 50 ppm	15/7	20/7	20/7	15/7	** + 5	+10	+10	+5
GA_3 1000 ppm	15/7	20/7	20/7	15/7	+5	+10	+10	+5
NAA 25 ppm	10/7	15/7	20/7	15/7	0	+5	+10	+5
NAA 250 ppm	10/7	15/7	20/7	15/7	0	+5	+10	+5
KNO_3 5%	30/6	20/6	25/7	20/6	-10	-20	-15	-20
Zn SO_4 25%	15/7	15/7	15/7	15/7	+5	+5	+5	+5
Urea 10 %	30/6	25/6	30/6	25/6	-10	-15	-10	-15

* - Number of earling days than the control .

** + Number of delaying days than the control .

(1986) Sourial et. al. (1993) and others all of them used hydrogen cyanamide to induce earlines of budburst, flowering and ripening in many grape cultivars in warm regions of the world.

IV.2.EFFECT OF SOME GROWTH REGULATORS AND NUTRIENT ELEMENTS ON CHEMICAL COMPOSION OF GRPEVINES BUDS

IV.2.1.Total Free Amino Acids Buds Contents :

Tables (9 and 10) show the effect of some growth regulators and nutrient elements and spraying date and their interaction on total free amino acids content in buds after 15 days from spraying date.

Concerning the specific effect of the two different factors involved in this study i-e agents used and spraying date, data obtained showed that Dormex (hydrogen cyanamide) was more effective agent in increasing free amino acids contents significantly in buds as compared with other agents used and control regardless of spraying date. Progressive increase obtained with increasing Dormex (hydrogen cyanamide,) concentration i.e from 1.25, 2.5 and 5 % during the two seasons of study.

While application of KNO_3 at 5 % , Zn SO_4 at 25 % and urea at 10 % increased free amino acids of buds in a less extent over control during the two seasons of study.

On the other hand GA_3 at 50 and 1000 ppm and NAA at 25 and 250 ppm significantly decreased the buds free amino acids contents in compariosn with the control during the two seasons of study.

Regarding the effect of interaction between agent used and spraying date, data in Tables (9 and 10) also revealed that spraying Thompson Seedless grapevines with Dormex (hydrogen cyanamide) at 2.5 and 5 % concentrations at all dates of spraying had the highest values of total free amino acids buds content since they ranged from 8.50 to 9.3 mg / gm dry weight after 15 days from spraying grapevines with Dormex (hydrogen cyanamide), against 4.03 to 6.20 mg / gm for control in the first season. While it ranged from 6.40 to 8.50 mg / gm and from 3.60 to 5.60 mg / gm respectively in the second season.

Furthermore application of KNO_3 at 5 %, Zn SO_4 at 25 % and urea at 10 % on February 1st significantly increased total free amino acids of buds over the control during the two seasons of study.

On the other hand spraying GA_3 at 50 and 1000 ppm and NAA at 25 and 250 ppm on 15 December had the lowest value in this respect. These values were significantly decreased in comparison with control during the two seasons of study.

In addition data declared that buds had a progressive increase by budbreak i.e from 15 December to February 1st during the two seasons of study.

The obtained results conferm with the finding of Rizk (1996) he found that Dromex (hydrogen cyanamide) treatment clearly increased amino acids contents in comparison with the control. May (1961) and kikvidze and Chanishili (1979) found that total soluble amino acids showed a progressive increase by budburst.

Table (9) : Effect of some growth regulators and nutrient elements on total free amino acids content in buds as mg per gm dry weight of Thompson Seedless grapevines at dormancy during 1993/1994 Season.

Date of Spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	4.03	4.43	5.72	6.20	5.10
H_2CN_2 1.25%	6.80	6.50	6.00	6.77	6.5
$H_2 CN_2$ 2.5%	9.20	9.03	9.37	8.27	97
H_2CN_2 5.0%	9.30	9.13	9.47	8.50	9.10
GA_3 50 ppm	2.50	3.47	5.03	5.97	4.24
GA_3 1000 ppm	2.20	3.80	5.33	5.67	4.25
NAA 25 ppm	2.10	4.30	5.30	5.97	4.42
NAA 250 ppm	2.70	3.50	4.60	5.73	4.13
KNO_3 5%	3.70	4.80	5.40	7.00	5.23
Zn SO_4 25%	4.20	5.30	5.10	6.47	5.27
Urea 10 %	3.43	5.33	5.20	6.60	5.14
* Averages	4.56	5.42	6.05	6.65	

LS.D at 0.05 for :

Date	0.05
Treatments	0.08
Date X Treatments	0.18

Buds content 2.73 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (10) : Effect of some growth regulators and nutrient elements on total free amino acids content in buds as mg per gm dry weight of Thompson Seedless grapevines at dormancy during 1994/1995 season.

Date of spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	3.60	4.40	5.33	5.60	4.73
H_2CN_2 1.25%	4.80	5.20	5.40	6.50	5.48
$H_2 CN_2$ 2.5%	8.40	6.40	7.90	8.20	7.73
H_2CN_2 5.0%	8.50	6.80	7.97	8.43	7.93
GA_3 50 ppm	2.40	3.60	4.80	5.33	4.03
GA_3 1000 ppm	2.37	3.90	4.90	5.40	4.14
NAA 25 ppm	2.00	4.20	5.20	6.40	4.45
NAA 250 ppm	2.80	3.80	4.20	6.70	4.38
KNO_3 5%	3.80	5.00	5.40	6.80	5.25
Zn SO_4 25%	4.00	4.80	5.20	7.20	5.30
Urea 10 %	3.50	5.40	5.20	6.90	5.25
* Averages	4.20	4.86	5.59	6.68	

LS.D at 0.05 for :

Date	0.07
Treatments	0.09
Date X Treatments	0.19

Buds content 2.4 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

IV.2.2. : Total non-Soluble Sugars Buds Contents :

Regarding the specific effect of agent used and spraying date Tables (11 and 12) clearly show that spraying Thompson Seedless grapevines with Dormex (hydrogen cyanamide) at 1.25, 2.5 and 5.0 %, KNO_3 at 5 % and urea at 10 % at dormant season significantly decreased total non-soluble sugars content of buds not only than other treatments but also below control during the two seasons of study regardless of the spraying date.

On the other hand application of GA_3 at 50 and 1000 ppm, and NAA at 25, 250 ppm and zinc sulphate at 25 % at dormant season gave higher values of total non-soluble sugars in buds than the control regardless of spraying date during two seasons of study.

Concerning the effect of spraying date data revealed that the total non-soluble sugars in buds were higher at the early dates at 15 December and decreased gradually up to latest date i.e February 1st Furthermore the data also indicated that at all dates of spraying the total-soluble sugars were less than the control regardless of the spraying agent, in the two seasons of study.

Regarding the effect of interaction between agents used and spraying date, data in Tables (11 and 12) disclosed generally that the level of total non-soluble sugars in buds was higher at early dates (15 December) and decreased gradually up to the latest date i.e February 1st which had the lowest value in this respect.

Furthermore the lowest values of total non-soluble sugars content were obtained by application of Dormex (hydrogen cyanamide) at any

Table (11) : Effect of some growth regulators and nutrient elements on total non-soluble sugars content in buds as mg/gm dry weight of Thompson Seedless grapevines at dormancy during 1993/1994 season.

Date of spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	9.00	7.80	6.40	5.60	7.20
H_2CN_2 1.25%	8.00	6.20	5.40	4.00	5.90
$H_2 CN_2$ 2.5%	7.80	5.60	5.00	3.60	5.50
H_2CN_2 5.0%	7.60	5.53	5.20	3.20	5.38
GA_3 50 ppm	9.80	8.40	8.20	6.40	8.20
GA_3 1000 ppm	8.40	8.60	7.47	6.60	7.77
NAA 25 ppm	10.20	9.20	8.93	6.40	8.68
NAA 250 ppm	9.27	9.40	9.20	6.80	8.67
KNO_3 5%	8.40	7.00	6.80	2.60	6.20
Zn SO_4 25%	9.40	8.00	8.20	6.00	7.90
Urea 10 %	9.80	6.80	6.60	3.00	6.55
* Averages	8.88	7.50	7.04	4.93	

LS.D at 0.05 for :

Date	0.27
Treatments	0.44
Date X Treatments	0.67

Buds content 14.8 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (12) : Effect of some growth regulators and nutrient elements on total non-soluble sugars content in buds as mg/gm dry weight of Thompson Seedless grapevines at dormancy during 1994/1995 season.

Date of Spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	9.83	7.40	6.60	5.20	7.26
H_2CN_2 1.25%	8.20	6.00	5.20	3.60	5.75
$H_2 CN_2$ 2.5%	7.40	5.20	4.80	3.00	5.10
H_2CN_2 5.0%	6.97	4.10	4.43	2.80	4.58
GA_3 50 ppm	9.40	8.20	8.00	6.20	7.95
GA_3 1000 ppm	8.20	8.40	8.40	6.40	7.85
NAA 25 ppm	10.00	9.00	8.60	6.00	8.40
NAA 250 ppm	10.20	9.20	9.00	6.40	8.70
KNO_3 5%	8.00	6.80	6.20	2.40	5.85
Zn SO_4 25%	9.00	7.80	7.80	5.80	7.60
Urea 10 %	9.60	6.40	6.40	3.20	6.40
* Averages	8.80	7.14	6.86	4.63	

LS.D at 0.05 for :

Date	0.18
Treatments	0.30
Date X Treatments	0.60

Buds content 15.0 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

concentration, KNO_3 at 5 % and urea at 10 % when sprayed at February 1st).

On the other hand the highest values in this respect had bern occurred in buds sprayed with GA_3 at 50 ppm, NAA at 25 and 250 ppm, urea at 10 % and Zn SO_4 at 25 % on 15 December and control at the same date during the two seasons of study.

IV.2.3.Total Soluble sugars Buds Content :

Tables (13 and 14) show that the effect of some growth regualtors and nutrient elements and spraying date, as will as their interatction on total soluble sugars buds content at dormant season, after 15 days from spraying .

Concerning the specific effect of the two factors involved in this study i-e agent used and spraying, date obtained data showed that Dormex application (hydrogen cyanamide) induced the highest values of total soluble sugars regardless of the spraying date during the two seasons of study. Progressive increase obtained by increasing Dormex (hydrogen cyanamide) concentration. Also application of KNO_3 at 5 % and urea at 10 % significantly increased total soluble sugars than the control but less than Dormex (hydrogen cyanamide) treatments regardless of spraying date.

On the other hand GA_3 application at 50 and 1000 ppm. NAA at 25 and 250 ppm and Zn SO_4 at 25 % at the two early dates (i.e. 15 December and January 1st) exhibited the lowest values of buds total soluble sugars content in the two seasons of study regardless of the spraying date.

Regarding the spicific effect of spraying date, data showed a progressive increase in total soluble sugars in buds from spraying date (15 Dec.) up to the lastest one on Feb. 1st regardless of the agents used during the two seasons of study.

Concerning the effect of interaction between agents used and spraying date, data in Tables (13 and 14) declared that spraying Thompson Seedless grapevines with Dormex (hydrogen cyanamide) at 2.5 and 5 % at any date of spraying caused a highly significant increase in buds total soluble sugars content after 15 days from spraying than the control and other treatments during the two seasons of study.

Furthermore Dormex application (hydrogen cyanamide) at 1.25 % at all any spraying date (i.e 15 December, January 1st, 15 January and February 1st), KNO_3 at 5% and urea at 10 % at February 1st had higher values of buds total soluble sugars content than the control during the two seasons of study.

On the other hand spraying grapevines with GA_3 at 50 and 1000 ppm, NAA at 25 and 250 ppm and Zn SO_4 at 25 % at the two eirly dates (i.e. 15 December and January 1st) exhibited the lowest values of buds total soluble sugars content in the two seasons of study.

The obtained results are in line with the findings of ***Rizk (1996)*** he foun that spraying Thompson. Seedless grapevines with 2.5% Dormex hydrogen cyanamide on 2nd January and 5th January increased the buds total sugars content. while on the contary ***Said (1982)*** concluded that treated plum tress during dormancy with GA_3 at 300

Table (13) : Effect of some growth regulators and nutrient elements on total soluble sugars content in buds as mg/gm dry weight of Thompson Seedless grapevines at dormancy during 1993/1994 season.

Date of spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	8.80	10.20	11.00	11.60	10.40
H_2CN_2 1.25%	13.53	13.00	13.80	13.60	13.48
$H_2 CN_2$ 2.5%	15.60	15.20	16.20	16.00	15.75
H_2CN_2 5.0%	15.80	15.60	16.60	16.20	16.05
GA_3 50 ppm	7.00	7.20	11.00	11.40	9.15
GA_3 1000 ppm	6.40	6.60	10.80	11.00	8.70
NAA 25 ppm	7.20	7.00	10.40	11.80	9.10
NAA 250 ppm	7.40	7.20	10.60	12.40	9.40
KNO_3 5%	9.40	9.20	12.00	14.20	11.20
Zn SO_4 25%	7.80	7.60	10.60	11.60	9.40
Urea 10 %	9.20	9.00	11.00	13.20	10.60
* Averages	9.83	9.80	12.18	13.00	

LS.D at 0.05 for :

Date	0.06
Treatments	0.11
Date X Treatments	0.22

Buds content 5.8 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (14) : Effect of some growth regulators and nutrient elements on total soluble sugars content in buds as mg/gm dry weight of Thompson Seedless grapevines at dormancy during 1994/1995 season.

Date of spraying / Treatments	15/12	1/1	15/1	1/2	Average **
Control	9.20	10.80	11.40	11.80	10.80
H_2CN_2 1.25%	13.80	12.80	13.60	13.40	13.40
$H_2 CN_2$ 2.5%	16.00	14.70	16.40	16.20	15.82
H_2CN_2 5.0%	16.40	15.00	16.40	16.43	16.06
GA_3 50 ppm	6.80	7.20	11.20	11.60	9.20
GA_3 1000 ppm	7.2	6.67	10.60	11.13	8.65
NAA 25 ppm	7.40	6.80	10.60	12.20	9.25
NAA 250 ppm	7.80	7.40	10.80	12.00	9.50
KNO_3 5%	9.00	9.00	12.40	14.00	11.10
Zn SO_4 25%	7.60	7.40	10.80	11.40	9.30
Urea 10 %	8.60	8.80	11.20	13.00	10.40
* Averages	9.89	9.68	12.31	13.02	

LS.D at 0.05 for :

Date	0.7
Treatments	0.12
Date X Treatments	0.24

Buds content 7.4 mg / gm dry weight on 15 December

Data was estimated 15 days from spraying .

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

ppm concentration increased buds total soluble sugars content and decreased the non soluble sugars in it.

IV.3. BUD BEHAVIOUR.

IV.3.1. Bud Burst Percenatge.

From Tables (15 and 16) it is clear that application of Dormex (hydrogen cyanamide) induced abvious effect on budburst percentage of Thompson Seedlees grapevines, data of the first season show that all used concentrations (1.25, 2.5 and 5%) sprayed on 15 December and lowest one (1.25%) on January first significantly depressed the budburst percentage in comparsion with control. Budburst percentage exhibitted by these treatments ranged from 31,31 to 60.0 % against 78.67 % for the control.

While application of Dormex (hydrogen cyanamide) at 2.5 and 5 % on January first and all concentrations at on either 15 January on February 1st increased significantly budburst percentage in comparison with the control and other treatments except zinc sulphate spraying on 15 December and Jan. first and GA_3 at 1000 ppm spraying on 15 Dec. only.

In the second season all tested concentrations (i.e 1.25, 2.5 and 5%) of Dormex (hydrogen cyanamide) applied on 15 December and January first gave the least value (28.67 - 70.0 %) of budburst percentage in comparison with control and other treatments. On the contrary the highest values in the second season resulted from the two last dates of Dormex (hydrogen cyanamide) application (i.e - 15 January and February first) with the all used concentrations except

1.25% on 15 January. Differences between any of Dormex (H_2CN_2) tested tratments and the control were highly significant.

Conclusively the obtained results reveal that early Dormex (hydrogen cyanamide) application (i-e 15 December and January first) reduced the budburst percentage.

While the later application (i-e 15 January and February first) increased it under all used concentrations. Furthermore the highest budburst percentage resulted from the latest dates (15 January and February first) of Dormex (hydrogen cyanamide) application with the higher concentrations (2.5 and 5 %).

The above results also clarified the hazard effect of early application of Dormex (hydrogen cyanamide) especially on 15 December spray in the two seasons of study which injured and significantly reduced budburst percentage to agreat extent.

This was in accordance with ***Smitt and Burnett (1986) Smitt (1985), Ghobrial and Abdel-Fattah (1993), Sourial et. al. (1993), Sabry (1994)***. They reported that not benefit is to be derived from earlier budbreak if continued growth is inhibited to agreat extent by cold weather. If the aim is an improved budbreak percentage,hydrogen cyanamide should be applied between two and three weeks before normal budbreak, which is during the imposed dormancy period.

Also Smitt and Burnett (1986) concluded that nothing is to be gained from early budburst if continued growth is hampered by weather cold or it destroyed by frost.

To early burbarst could mean that flower cluster formation take place under unfavorable weather conditions which may lead to poor berry set.

Cyanamide should prefarably not to be appplied during deep winter dormancy because this could lead to a poor budburst percentage, where a higher budding percentage is aimad at Dormex (hydrogen cyanamide) should be applied later in the period of imposed dormancy namely 5 to 2 weeks before normal budding.

Ghobrial and Abdel-Fattah (1993) showed that the hgihest budburst of Thompson Seedless and Romi Red grapevines observed when hydrogen cyanamide was applied 45 days before normal budbreak in comparison with spraying on 60 to 75 days before normal budbreak.

Regarding the effect of GA_3 treatments on budburst percentage, the data revealed that early spraying on 15 December and January 1st increased budburst percentage in comparsion with the control in both seasons of investigation while, later ones on 15 January and February 1st decreased it significantly, this was true in two seasons of study.

On the contaray ***El-Shahat (1992)*** found that spraying Thompson Seedless grapevines with GA_3 at 500 ppm, after Winter pruning on February1st increased budburst percentage over the control.

Furthermore the lower concentration of NAA (25 ppm) in all dates of spraying reduced the budburst percentage than the control during the two seasons of study. While the higher concentration of to NAA (250 ppm) increased significantly the budburst percentage when sprayed on

Table (15) : Effect of some growth regulators and nutrient elements on bud behaviour of Thompson Seedless grapevines during 1993/1994 season.

Date of spraying / Treatments	Budburst %					Fruitful shoots %					Number of flower cluster per vine				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	78.67	78.67	78.67	78.67	78.67	30.67	30.67	30.67	30.67	30.67	19.0	19.0	19.0	19.0	19.0
H_2CN_2 1.25%	31.31	60.0	80.0	87.67	64.75	36.00	33.33	28.67	32.0	32.5	8.0	14.0	16.0	20.0	14.50
H_2 CN_2 2.5%	40.0	87.33	92.67	96.67	79.17	32.00	29.67	35.33	43.00	35.00	10.00	20.00	22.00	29.00	20.25
H_2CN_2 5.0%	54.00	85.67	94.33	97.00	92.75	31.67	32.00	31.67	41.00	34.00	12.00	19.00	23.00	29.00	20.75
GA_3 50 ppm	80.00	65.67	70.00	63.00	69.67	28.67	28.33	34.67	29.67	30.33	17.00	18.00	18.00	15.00	17.00
GA_3 1000 ppm	87.00	70.0	71.33	6193	72.58	22.67	34.67	36.0	27.67	30.25	15.0	17.0	19.0	13.0	16.0
NAA 25 ppm	70.0	74.33	77.33	51.33	68.25	28.67	23.33	29.67	41.67	30.83	16.0	15.0	17.0	15.0	15.75
NAA 250 ppm	74.0	75.67	80.0	83.0	78.17	28.33	32.00	39.90	36.0	33.83	15.0	17.0	22.0	21.0	18.75
KNO_3 5%	61.33	71.33	54.33	68.67	61.42	39.67	28.67	36.67	31.0	34.0	18.0	12.0	19.0	15.0	16.0
Zn SO_4 25%	97.0	92.67	80.0	73.0	85.67	26.33	29.00	37.67	39.33	33.8	18.0	21.0	21.0	21.0	20.25
Urea 10 %	80.0	74.33	75.67	83.0	78.25	30.33	30.67	38.0	25.67	31.17	17.0	22.0	20.0	19.0	19.50
* Averages	68.85	75.06	77.67	76.67		30.45	30.24	34.39	34.33		15.0	17.64	19.64	19.64	

LS.D at 0.05 for :			
Date	0.70	0.62	0.56
Treatments	1.16	1.02	0.93
Date X Treatments	2.32	2.04	1.86

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (16) : Effect of some growth regulators and nutrient elements on bud behaviour of Thompson Seedless grapevines during 1994/1995 season.

Treatments \ Date of spraying	Budburst %					Fruitful shoots %					Number of flower cluster per vine				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	82.67	82.67	82.67	82.67	82.67	36.00	36.00	36.00	36.00	36.00	22.00	22.00	22.00	22.00	22.00
H_2CN_2 1.25%	28.67	54.33	78.67	91.33	63.27	40.00	39.33	30.67	30.00	35.00	80.00	15.00	17.00	19.70	14.90
$H_2 CN_2$ 2.5%	35.67	68.67	94.00	99.00	74.33	44.00	33.33	33.00	40.33	37.67	11.00	16.00	22.00	28.70	19.40
H_2CN_2 5.0%	45.67	70.0	97.00	99.97	78.08	40.67	32.67	32.00	38.67	36.00	13.00	16.00	22.00	27.70	19.70
GA_3 50 ppm	82.67	75.67	76.00	37.00	76.83	22.33	26.33	28.00	33.33	27.50	13.00	14.00	15.00	17.70	14.90
GA_3 1000 ppm	90.00	78.67	77.00	76.00	80.42	20.67	27.33	29.67	33.67	27.83	13.00	15.00	16.00	18.70	15.70
NAA 25 ppm	75.67	77.33	80.00	86.00	79.75	32.00	29.67	28.67	30.00	30.08	17.00	17.00	18.00	18.70	17.70
NAA 250 ppm	78.67	80.00	88.67	91.33	84.67	31.00	34.00	32.00	31.00	32.00	18.00	19.00	19.00	20.70	19.20
KNO_3 5%	74.33	70.00	63.00	71.31	69.67	32.67	34.67	38.67	36.00	35.50	18.00	17.00	18.00	18.70	17.90
$Zn SO_4$ 25%	91.33	85.67	81.33	76.00	83.58	23.33	28.33	31.67	35.67	29.75	15.00	17.00	18.00	19.70	17.40
Urea 10 %	84.33	82.67	80.00	87.00	83.50	32.00	31.00	33.67	33.00	32.42	19.00	18.00	19.00	20.30	19.10
* Averages	69.97	75.06	81.67	84.85		32.24	32.06	32.18	34.33		15.20	16.90	18.70	21.10	

LS.D at 0.05 for :			
Date	0.88	0.43	0.40
Treatments	1.47	0.71	0.68
Date X Treatments	2.93	1.42	1.25

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

the two latter dates (15 January and February 1st) in two seasons of study.

Data also showed that spraying KNO_3 at 5 % decreased significantly budburst percentage of Thompson Seedless grapevines than the control.

Concerning the effect of spraying zinc sulphate at 25 % on Thompson Seedless grapevines, data showed that. The two earlier date (15 December and January first) increased significantly the budbnurst percentage over the control, this was true in the both seasons of study. While the later spraying dates (15 January and February1st) took a reverse trend in this respect.

Spraying urea at 10 % after pruning induced in the latest date only (February 1st) and increase in budburst percentage than the control during the two seasons of study.

On the other hand the previous spraying dates (i-e 15 December, January 1st and 15 January) of urea decreased significantly budburst percentage.

IV.3..2. Percentage of Fruitful Shoots;

Regarding the specific effect of the two factors involved in this study i-e sprayed agents and spraying date on the percentage of fruitful shoots, data in Tables (15 and 16) showed that Dormex (hydrogen cyanamide) at 2.5 and 5.0 % had significantly the greatest percentage of fruitful shoots in both seasons regardless of spraying date. Wherease spraying with GA_3 at low (50 ppm) and high (1000 ppm) concentration took the other way around. In addition spraying NAA at 25 ppm and

KNO_3 at 5% later on 15 January and February 1st .proved to be the best time for spraying in both seasons, regardless of the agent used

Also Tables (15 and 16) indicates a significant effect as a result of the interaction between kind of used agents and spraying date in the first season the highest values were obtained by the treatments with Dormex (hydrogen cyanamide) at 2.5 and 5.0 % NAA at low concentration (25 ppm) and 25 % zinc sulphate sprayed on February 1st. Moreover spraying NAA at 250 ppm, on 15 Jan. KOo_3 at 5 % on 15 Dec. and 15 Jan. and urea at 10 % on 15 January, significantly increased percentage of fruitful shoots over the control.

On the contaray spraying NAA at 25 ppm and zinc sulphate on 15 December and urea at 10% and GA_3 at 50 and 1000 ppm on February 1st significantly decreased the percentage of fruitful shoots than the control.

In the second season the interaction between agents and spraying dates, data revealed that Dormex (hydrogen cyanamide) at all concentrations on early date (15 December) increased fruitful shoots percent than the control, and other agent used this is due to that these treatments had the less budburt percent so this increment was not true as a number. While the best treatments in this respect were spraying Dormex (hydrogen cyanamide) at 2.5 and 5.0% on the latest date (February 1st. and KNO_3 at 5 % on 15 January) which gave a real significant increase in fruit ful shoots percent than the control. On the other hand all other treatmetns used significantly decreased the percent of fruitful shoots than the control.

The obtained results are in line with the findings of ***Sourial et. al. (1993)*** who found that fruitfulness of Thompson Seedless grape c.v. were greatly increased by some Dormex (hydrogen cyanamide) treatments, the increments of bud fruitfulness percentage resulted from the latest date of application on (16 and 29 Jan.) and higher tested concenration (3.5 %).

Also Sabry (1994) reported that spraying Delight, Perlette and Black Rose grapevines with hydrogen cyanamide on December 1st decreased fruitful buds percentage, while spraying on January 1st increased it.

IV.3.3. Number of Flower Cluster Per Vine :

Concerning the specific effect of two factors involved in this study i-e spraying agent used and time of spraying date in Tables (15 and 16) revealed that spraying Dormex (hydrogen cyanamide) at 2.5 and 5.0 % and zinc sulphate at 25 % significantly increased number of flower clusters per vine over the control and other used agents in the first season regardless of spraying date. Conversily all other used agent look the other way arround.

In the second season also data indicated that the most effective agent in this respect was Dormex (hydrogen cyanamide) at 2.5 and 5.0 % concentration.

In addition the later spraying date (i-e on 15 January and February 1st) induced the highest number of flower clusters regardless of agent used durign the two seasons of study.

Also Tables (15 and 16) indicate the effect of interaction between kind of agent and spraying date on number of flower clusters per vine. Data show that spraying Dormex (hydrogen cyanamide) at the early dates (15 December and January 1st) significantly decreased number of flower clusters per vine than the control, while spraying Dormex (hydrogen cyanamide) at 2.5 and 5.0% lately on 15 January and February 1st had the highest values in this respect, followed by in a descending oredr a by spraying with NAA at 250 ppm, Zn SO_4 at 25% on the same dates and urea at 10 % sprayed on first and 15 January in the first season .

Differences between any of these treatments and the control were significant.

On the other hand GA_3 at 50 and 1000 pm, NAA at 25 ppm, KNO_3 at 5 % and Dormex (hydrogen cyanamide) at two concentration (1.25%) decreased significantly the number of flower clusters. In the second season the highest values in this respect was obtained by spraying hydrogen cyanamide at 2.5 and 5.0% on February 1st, while the other treatmets showed the reverse effect in this respect and significantly decreased number of flower clusters.

VI.4. YIELD PER VINE :

Regardless of spraying date, data in Tables (17 and 18) showed that the highest yield per vine obtained by spraying Zn SO_4 at 25%. Dormex (hydrogen cyanamide) at 2.5 and 5.0%, GA_3 at 1000 ppm and urea at 10%with these treatments the yield per vine were 8.98, 8.13, 8.03, 7.73 and 7.28 against 5.8 kg. for the control in the first season.

Moreover in the second season also application of Zn SO_4 at 25% produced higher values in this respect followed by GA_3 at 1000 ppm, GA_3 at 50 ppm and Dormex (hydrogen cyanamide) at 5%.

On the contarary spraying Thompson Seedless grapevines with NAA at 25 ppm significantly decreased yield than the control during the two seasons of study.

In addition the specific effect of spraying date Tables (17 and 18) show that two later spraying dates (15 January and February 1st) gave the highest values in this respect regardless of agents used.

Regarding to the effect of interaction between kind of agent and spraying date, data show clearly that application of Dormex (hydrogen cyanamide) at 2.5 and 5.0% and zinc sulphate at 25% on 15 January and February first gave the highly significant increase in the yield followed ina descending order by using Zn SO_4 on early dates (15 December and January first) of spraying, GA_3 on February 1st, urea at (10%) on January 1st ,15 and February 1st, NAA at 250 ppm sprayed on 15 January and February 1st and KNO_3 at 5%in the first season. While in the second season the highest yield was obtained by spraying Zn SO_4 at 25% hydrogen cyanamide at 2.5 and 5% and GA_3 at 50 and at 1000 ppm, on two later dates of spraying i-e.15 January and February 1st.

On the contrary application of all concentrations of hydrogen cyanamide at early dates of spraying i-e. 15 December and January 1st took the other way around.

Furthermore spraying NAA at 25 and 250 ppm and KNO_3 at 5% in all dates of spraying significantly decreased yield than the control.

Table (17) Effect of some growth regulators and nutrient elements on yield per vine (kg) of Thompson Seedless grapevines during 1993 /1994 season.

Treatments \ Date of spraying	Yield per vine (kg)								
	15/12		1/1		15/1		1/2		Averages **
	kg.	R.V	kg.	R.V	kg.	R.V	kg.	R.V	
Control	5.80	100.0	5.80	100.0	5.80	100.0	5.80	100.0	5.80
H_2CN_2 1.25%	4.6	79.3	6.0	103.4	7.0	120.7	7.1	122.4	6.18
$H_2 CN_2$ 2.5%	6.0	103.4	7.4	127.6	9.4	162.1	9.7	167.4	8.13
H_2CN_2 5.0%	6.0	103.4	6.6	113.8	9.6	165.5	9.9	170.7	8.03
GA_3 50 ppm	6.0	103.4	6.1	105.2	6.3	108.6	8.0	137.9	6.60
GA_3 1000 ppm	7.1	122.4	7.7	132.8	7.7	132.8	8.4	144.8	7.73
NAA 25 ppm	6.2	106.9	4.9	84.5	5.6	96.6	5.8	100.0	5.60
NAA 250 ppm	5.0	86.2	5.9	101.7	7.6	131.00	7.8	134.5	6.58
KNO_3 5%	6.8	117.2	5.9	101.7	6.4	110.3	6.5	112.1	6.40
Zn SO_4 25%	8.7	150.0	8.9	153.4	9.0	155.2	9.3	160.3	8.98
Urea 10 %	5.6	96.6	8.0	137.9	7.7	132.8	7.8	134.5	7.28
* Averages	6.16		6.65		7.46		7.82		

LS.D at 0.05 for :

Date	0.8
Treatment	0.13
Date X Treatment	0.27

R.V. = Relative value in relation to the control as 100.

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (18) Effect of some growth regulators and nutrient elements on yield per vine (kg) of Thompson Seedless grapevines during 1994 /1995 season.

Treatments \ Date of spraying	Yield per vine (kg)								Averages **
	15/12		1/1		15/1		1/2		
	kg.	R.V	kg.	R.V	kg.	R.V	kg.	R.V	
Control	6.67	100.0	6.67	100.0	6.67	100.0	6.67	100.0	6.67
H_2CN_2 1.25%	2.43	36.0	4.19	63.0	5.32	89.8	5.72	85.8	4.43
$H_2 CN_2$ 2.5%	3.33	50.0	5.66	85.0	7.92	118.7	9.49	142.3	6.60
H_2CN_2 5.0%	4.57	69.0	5.78	87.0	8.07	121.0	10.04	120.5	7.12
GA_3 50 ppm	7.38	110.6	7.87	118.0	8.64	129.5	9.95	149.2	8.46
GA_3 1000 ppm	7.49	112.3	8.81	132.1	9.44	141.5	10.63	159.4	9.09
NAA 25 ppm	5.40	81.0	5.41	81.1	5.78	86.7	5.73	85.9	5.58
NAA 250 ppm	5.76	86.0	6.00	90.0	6.22	93.9	6.63	99.4	6.15
KNO_3 5%	5.80	87.0	5.61	87.1	5.86	87.9	5.88	88.2	5.79
Zn SO_4 25%	8.03	120.4	8.90	133.4	9.50	142.4	9.97	149.5	9.10
Urea 10 %	6.26	94.0	6.03	90.4	6.35	95.2	7.25	108.7	6.47
Averages*	5.74		6.45		7.25		8.00		

LS.D at 0.05 for :

Date	0.06
Treatments	0.10
Date X Treatments	0.19

R.V. = Relative value in relation to the control as 100.

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Also application of urea at 10% significantly decressed yield in the three early dates (15 Dec. and 1, 15 Jan.) of spraying . While its sprayind later on February 1st signiicvantly increased the yield over the control.

The obtained results are in agreement with the findings of ***Mc Coll (1986), Foot. (1987), Nazemill (1987), Castaran (1987), Sourial et. al. (1993), Rizk and Rizk (1994),*** all of them reported that H_2CN_2 application at proper time at dormant season caused an increase in the yield of some grape cultivars.

Furthermore Mc Coll (1987) found that application of (H_2CN_2) on 16 on 12 weeks (early) be fore the natuaral budburst caused a sever reduction in bunches and the yield

Also the obtained results go in line with the findings of ***El-Shahat (1992)*** who reported that spraying Thompson Seedless grapevines with Zn SO_4 at 20% and GA_3 at 500 ppm at dormant season after pruning increased the yield per vine.

Conclusively, the obtained results clarified that :

* Application of Zn SO_4 at 25% on all dates of spraying gave the highest yield.
* Spraying Dormex (H_2CN_2) at 2.5 and 5% concentration on two later dates (i.e. 15 Jan. and Feb. 1st) also produced significantly higher yield as Zn SO_4, while the lower concentration of Dormex (H_2CN_2) at 1.25% and early spraying date on 15 Dec. and Jan. 1st significantly decreased yield especially in the second season than the control.

* Also spraying GA_3 with low and high (50 and 1000 ppm) concentrations on the two later dates (15 January and February 1st) significantly increased the yield .
* Urea application at 10% on the two later dates (15 January and February 1st) significantly increased yield over the control but some what less than the above treatments.
* NAA application and KNO_3 in the second season decreased the yield than the control.

VI.5. PHYSICAL PROPERTIES OF BERRIES AND CLUSTERS :

VI.5.1 -Berry Length :

Regarding the specific effect of agents used on berry length , data in Tables (19 and 20) showed that spraying Thompson Seedless grapevines with Dormex (H_2CN_2) at 2.5 and 5% concentrations, GA_3 at 50 and 1000;ppm and Zn SO_4 at 25% after Winter pruning at dormant season significantly increased berry length over the control and other treatments during the two seasons of study , regardless the sprayings date. Furthermore spraying (H_2CN_2) at 2.5 and 5% had the longest berries.

Concerning the specific effect of spraying date the data show that all spraying dates significantly increased berry length , regardless of the agents used during the two seasons of study .

With respect of the interaction between the agents used and spraying dates, data in Tables (19 and 20) shows that Dormex (H_2CN_2) application at 2.5 and 5% and Zn SO_4 at 25% at all spraying dates significantlys increased berry length over the control and other treatments during the two seasons of study .

IV.5.2- Berry Width :

Generally, data tabulated in Tables (19 and 20) indicated that all treatments used except Dormex (hydrogen cyanamide) treatments at 2.5 and 5% concentrations significantly decreased berry width than the control, regardless of the spraying date during the two seasons of study.On the other hand Dormex (hydrogen cyanamide) application at 2.5 and 5% concentrations significantly increased berry width over the control during the two seasons of study.

Regarding the specific effect of spraying date on berry width , data revealed that spraying at any dates decreased berry width , regardless of the agents used in the two seasons of study .

Concerning the interaction between agents used and spraying date data in Tables (19 and 20) declared that all agents treatments at all spraying dates used significantly decreased the berry width . Conversely Dormex (hydrogen cyanamide) application at 2.5 and 5% concentrations at any date of spraying (i-e 15 Dec,Jan . 1st, 15 and Feb . 1st) significantly increased it .

Furthermore Dormex (H_2CN_2) application at 2.5 % on 15 Dec. and Jan . 1st. and H_2CN_2 at 5% on 15 Dec. gave the highest values in this respect, in the first season, while in the second season application of Dormex (H_2CN_2) at Jan 1st and Dromex H_2CN_2 at 5% on 15 Dec., 1 and 15 Jan . gave the highest berry width.

VI.5.3- Berry Length / Width (shape index) :-

Berry length /width determines the (shape index) of the berry . Data in Tables (19 and 20) showed that all tested treatments significantly increased berry length /width over the control, regardless of the speraying date, during the two seasons of study .

Table (19) : Effect of some growth regulators and nutrient elements on berry dimensions (length and width in cm.) and shape index of Thompson Seedless grapevines during 1993/1994 season.

Treatments \ Date of spraying	Berry length (Cm)					Berry width (Cm)					Berry length / width (shape index)				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	1.5	1.5	1.5	1.5	1.5	1.3	1.3	1.3	1.3	1.3	1.15	1.15	1.15	1.15	1.15
H_2CN_2 1.25%	1.4	1.5	1.5	1.5	1.5	1.1	1.1	1.3	1.2	1.2	1.3	1.4	1.2	1.3	1.3
$H_2 CN_2$ 2.5%	2.2	2.3	2.3	2.2	2.3	1.5	1.6	1.4	1.3	1.5	1.5	1.4	1.6	1.7	1.6
H_2CN_2 5.0%	2.2	2.4	2.4	2.2	2.3	1.6	1.4	1.3	1.4	1.4	1.4	1.7	1.8	1.7	1.7
GA_3 50 ppm	2.2	2.2	2.1	2.0	2.1	0.8	1.0	1.0	1.0	1.0	2.8	2.2	2.1	2.0	2.3
GA_3 1000 ppm	2.4	2.3	2.2	2.1	2.3	1.0	1.1	1.0	1.0	1.0	2.4	2.2	2.2	2.1	2.2
NAA 25 ppm	1.6	1.8	1.6	1.4	1.6	0.8	1.0	0.9	0.7	0.9	2.0	1.8	1.7	2.0	1.9
NAA 250 ppm	1.8	1.8	1.7	1.6	1.7	1.0	1.1	1.0	0.9	1.0	1.8	1.6	1.7	1.8	1.7
KNO_3 5%	1.6	1.6	1.8	1.7	1.7	0.8	0.8	0.9	0.9	0.9	2.0	2.0	2.0	1.9	2.0
$Zn SO_4$ 25%	2.1	2.0	1.9	2.0	2.0	1.0	1.0	0.9	1.0	1.0	2.1	2.0	2.1	2.0	2.1
Urea 10 %	1.7	1.5	1.6	1.8	1.6	0.8	0.9	1.1	1.0	1.0	2.1	1.7	1.5	1.8	1.8
* Averages	1.88	1.85	1.97	1.82		1.06	1.11	1.10	1.05		1.87	1.75	1.74	1.77	

LS.D at 0.05 for :			
Date	0.07	0.06	0.07
Treatments	0.11	0.10	0.10
Date X Treatments	0.22	1.19	0.21

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (20) : Effect of some growth regulators and nutrient elements on berry dimensions (length and width in cm.) and shape index of Thompson Seedless grapevines during 1994/1995 season.

Date of spraying / Treatments	Berry length (Cm)					Berry width (Cm)					Berry length / width (shape index)				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	1.6	1.6	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.23	1.23	1.23	1.23	1.23
H_2CN_2 1.25%	1.7	1.8	1.8	1.6	1.7	1.1	1.1	1.2	1.3	1..2	1.5	1.4	1.5	1.2	1.4
$H_2 CN_2$ 2.5%	2.1	2.00	1.9	1.7	1.9	1.4	1.31	1.5	1.3	1.5	1.5	1.3	1.3	1.3	1.4
H_2CN_2 5.0%	2.0	2.1	2.2	1.9	2.1	1.7	1.61	1.6	1.5	1.7	1.2	1.2	1.4	1.3	1.3
GA_3 50 ppm	2.1	2.0	2.1	2.1	2.1	0.9	1.8	0.9	0.9	0.9	2.3	2.0	2.3	2.3	2.0
GA_3 1000 ppm	2.3	2.1	2.1	2.2	2.1	0.9	1.0	0.9	1.0	0.9	2.5	2.6	2.3	2.2	2.4
NAA 25 ppm	1.6	1.7	1.6	1.5	1.6	0.9	0.8	1.1	0.8	1.0	1.7	1.5	1.5	1.9	1.7
NAA 250 ppm	1.8	1.7	1.6	1.7	1.7	1.1	1.1	1.2	1.1	1.2	1.6	1.4	1.3	1.5	1.5
KNO_3 5%	1.7	1.6	1.4	1.3	1.5	0.9	1.2	1.0	0.8	0.9	1.9	1.7	1.6	1.6	1.7
$Zn SO_4$ 25%	1.9	1.8	2.0	1.9	1.9	0.9	0.9	0.8	0.9	0.9	2.1	2.5	2.0	2.1	2.2
Urea 10 %	1.6	1.3	1.4	1.5	1.5	1.0	0.8	1.1	1.2	1.1	1.6	1.4	1.3	1.3	1.0
* Averages	1.85	1.79	1.76	1.73		1.10	1.15	1.15	1.10		1.74	1.65	1.61	1.63	

LS.D at 0.05 for :			
Date	0.06	0.05	0.06
Treatments	0.10	0.08	0.9
Date X Treatments	0.20	1.17	0.18

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Regarding the specific effect of spraying date also data revealed that all spraying dates significantly increased berry length /width in comparison with the control, in the two seasons of study .

Concerning the effect of interaction between agents used and spraying date, data in Tables (19 and 20) show that GA_3 application at 50 and 1000 ppm, Zn SO_4 at 25% on all spraying dates gave the highest berry length /width during the two seasons of study since they gave the most obonged berries.

The obtained results confirm the finidings of ***Hiffny et.al. (1980)***, ***Youssif et. al. (1984) and Gill et. al. (1989),*** they found that spraying grapevines with GA_3 increased berry dimensions. ***Also Rizk*** and ***Rizk (1994), Abdel - All (1996) and Shehata (1996)*** reported that spraying grapevines with Dormex (H_2CN_2) increased length and width of grape berries and berry shape index.

IV.5.4 Gluster weight

Generally data tabulated in Tables (21 and 22) indicated that all treatments used except Dormex (hydrogen cyanamide) at 1.25 % concentration significantly increased cluster weight than the control, in two seasons of study , regardless of the spraying date.The heaviest clusters were obtained by spraying GA_3 at 1000 ppm and 50 ppm and zinc sulphate at 25% .

Thus the average cluster weights of those treatments were 619.9, 588.7 and 540,3 gm . against 303.7 for the control in the first season respectively . While in the second season its weight reached to 585.8, 572.7 and 528.9 gm . against 303.0 gm for the control respectively .

Also Dormex (hydrogen cyanamide) application at 5.0% and 2.5 %, urea at 10 %, KNO_3 at 5% , NAA at 25 and 250 ppm increased cluster wiehgt over the control , but the increament was less than the above treatments.

As for the specific effect of spraying date, it is quite clear that as the application date was delayed the heavier clusters were produced , wheares both dates of mid Jan. and Feb. 1st were the most effective during two seasons of study

Concering the effect of interaction between agents used and spraying date, data in Tables (21 and 22) also declared that spraying with GA_3 at 1000 and 50 ppm and Zn SO_4 at 25% on all spraying dates had the heaviest clusters weight followed in a descending order by Dormex (hydrogen cyanamide) at 5% and 2.5 %, urea at 10%, KNO_3 at 5%, and NAA at 25 and 250 ppm , in the two seasons of study .

Differences between any of the tested treatments and the control were stastistically significant .

On the other hand spraying hydrogen cyanamide at low concentration 1.25% on early two spraying dates i-e. 15 December and January 1st significantly decreased cluster weight than the control during two seasons of study .

The obtained results confirm the finidngs of ***Nazemille (1987)*** who found that spraying grapevines with hydrogen cyanamide between mid - December and mid - January increased inflorescence weight . Another results were reported by ***Ahmed (1993)*** on Romi Red grape . ***Sourial et. al. (1993) on Thompson Seedless grape. Ghobrial and Abdel - Fattah (1993a)*** on Thompson Seedless and Romi Red and others.

Also El- Shahat (1992) reported that spraying Thompson Seedless grapevines with GA_3 at 500 ppm at dormant season on (February 1st) increased cluster weight and cluster length .

Concerning the effect of urea many investigators reported that foliar application of urea increased cluster weight of many grape cultivars as ***Ahmed et. al. (1989), El - Morsy et. al. (1993) and Faissal et. al. (1993)***

IV.5.5- Berry Weight :

Data presented in Tables (21and 22) indicated that spraying Dormex (H_2CN_2), GA_3 and Zn SO_4 significantly increased berry weight than the control and other treatments used during the two seasons of study.Moreover Dormex (H_2CN_2) at all used concentrations i-e 1.25, 2.5 and 5% gave the highest significant effect in this respect. On the other hand NAA at 25 and 250 ppm reduced significantly the weight of berries in comparison with other treatments used and the control .

Concerning the effect of urea at 10 % and KNO_3 at 5% they had no effect on berry weight, in the two seasons of study .Regarding the specific effect of spraying date, obtained data declared that the berry weight was significantly increased parallelling to delaying sprays. Such trend was true during 1993 / 1994 season whereas two latter dates were the superior while in second season sprays on Jan. 15th was the most suitable in this regard.

Regarding the effect of interaction between agents used and date of spraying on berry weight data in Tables (21 and 22) also showed that Dormex (H_2CN_2) at all used concentrations and all dates of spraying gave the highest berry weight , followed by using GA_3 at 1000 and 50 ppm and Zinc sulphate at 25% in a descending order during the two seasons of study .

On the other hand spraying NAA at 25 and 250 ppm on all dates of spraying decreased berries weight in the first season, while in the second season early spraying dates (15 December and January 1st) had a reverse effect in this respect.

Our results are in harmony with the findings of ***Sourial et. al. (1993)*** who found that spraying Thompson Seedless grapevines with hydrogen cyanamide at 2.5 and 3.5% increased significantly 100 - berry weight .

Table (21) : Effect of some growth regulators and nutrient elements on cluster weight (gm), 100 berry weight (gm), and cluster stem percentage of Thompson Seedless grapevines during 1993 - 94 season.

Date of spraying / Treatments	Cluster weight (gm)					100-berry weight					Cluster stem %				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	303.7	303.7	303.7	303.7	303.7	198.3	198.3	198.3	198.3	198.3	6.3	6.3	6.3	6.3	6.3
H_2CN_2 1.25%	293.3	295.3	305.3	304.0	299.5	250.0	258.3	235.3	249.7	252.8	7.4	7.3	7.4	7.3	7.3
$H_2 CN_2$ 2.5%	371.7	369.7	370.0	375.0	371.6	250.3	255.3	252.0	250.7	252.1	7.4	7.5	7.3	7.8	7.5
H_2CN_2 5.0%	376.0	368.3	365.3	380.0	372.4	253.0	263.3	250.0	251.0	254.1	7.3	7.7	7.5	8.1	7.7
GA_3 50 ppm	580.7	584.7	588.0	588.3	585.4	219.0	221.3	222.3	227.3	222.5	7.6	7.9	8.1	8.1	7.9
GA_3 1000 ppm	612.3	617.0	619.0	619.3	616.9	230.7	229.3	236.3	235.7	233.0	8.0	8.4	8.5	8.4	8.3
NAA 25 ppm	325.7	329.3	330.7	327.7	328.3	192.7	194.3	192.0	198.0	194.3	6.5	6.7	7.0	7.0	6.8
NAA 250 ppm	328.3	320.0	332.0	335.3	328.9	196.3	194.3	192.3	192.7	193.9	6.5	6.7	6.7	6.7	6.7
KNO_3 5%	333.7	335.0	339.3	338.3	336.6	191.3	194.7	197.7	206.0	197.4	6.6	7.2	7.2	7.2	7.0
Zn SO_4 25%	542.3	544.0	538.3	536.7	540.3	218.7	223.0	223.7	220.0	221.3	7.7	8.2	8.1	7.6	7.9
Urea 10 %	329.7	340.0	341.0	344.7	339.0	194.3	197.3	199.7	205.0	199.1	7.80	8.3	8.3	8.4	8.2
* Averages	399.8	400.7	403.0	404.8		217.7	220.9	219.7	221.3		7.2	7.5	7.5	7.5	

LS.D at 0.05 for :			
Date	1.7	1.1	0.08
Treatments	2.8	1.83	0.13
Date X Treatments	5.7	3.66	0.27

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (22) : Effect of some growth regulators and nutrient elements on cluster weight (gm), 100 berry weight (gm) and cluster stem percentage of Thompson Seedless grapevines during 1994/1995 season.

Treatments \ Date of spraying	Cluster weight (gm)					100-berry weight					Cluster stem %				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	303.0	303.0	303.0	303.0	303.0	208.0	208.0	208.0	208.0	208.0	6.1	6.1	6.1	6.1	6.1
H_2CN_2 1.25%	282.3	279.0	312.7	304.0	294.5	242.3	246.0	246.3	241.0	243.9	7.4	7.4	7.5	7.6	7.5
H_2CN_2 2.5%	342.3	354.0	360.0	345.7	350.0	245.0	245.3	252.3	245.7	247.1	7.2	7.2	7.2	7.7	7.3
H_2CN_2 5.0%	352.3	362.0	367.0	371.7	363.0	247.7	247.0	251.7	249.0	248.8	7.4	7.4	7.5	8.0	7.6
GA_3 50 ppm	567.7	562.3	575.7	585.0	572.0	224.0	221.7	225.7	225.7	224.3	7.5	8.0	8.0	8.0	7.9
GA_3 1000 ppm	575.7	587.3	590.0	590.0	585.8	234.3	230.0	233.7	236.3	233.6	7.8	8.2	8.1	8.3	8.1
NAA 25 ppm	317.7	318.0	321.0	318.0	318.7	211.3	203.7	209.3	202.7	206.8	6.5	7.0	6.6	7.0	6.8
NAA 250 ppm	320.0	316.0	327.3	331.7	323.8	218.3	212.3	207.7	204.7	210.8	6.6	7.2	6.8	7.2	7.0
KNO_3 5%	322.3	330.0	325.7	326.3	326.1	210.7	214.0	216.3	216.0	213.3	6.3	7.2	7.1	7.1	6.9
Zn SO_4 25%	535.0	523.3	532.7	524.7	528.9	217.0	222.0	225.7	223.7	221.1	7.7	7.9	7.8	7.5	7.8
Urea 10 %	329.3	334.8	334.3	329.3	331.9	205.7	208.7	207.7	205.7	206.9	7.7	8.1	8.2	8.3	8.1
* Averages	386.2	388.2	395.4	393.6		224.0	223.5	225.9	223.5		7.1	7.4	7.4	7.5	

LS.D at 0.05 for :			
Date	1.6	1.28	0.09
Treatments	2.7	2.12	0.15
Date X Treatments	5.3	4.23	0.30

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Also El - shahat (1992) mentioned that spraying Thompson Seedless grapevines with 20% Zn SO_4 and GA_3 at 500 ppm at dormant season increased 100 berry weight . Analogical results were obtained by Foott *(1987) ,Ahmed (1993), Seleem Basma (1996), Rizk and Rizk (1994) , Ahmed et. al. (1995) and Shehata (1996).*

IV.5.6. Cluster stem Percentage :

Regarding the specific effect of agents used and spraying dates on the cluster stem percentage , data in Tables (21 and 22) showed that all treatments siginficantly increased cluster stem percentage in comparison with the control regardless of spraying date. Moreover GA_3 at 50 and 1000 ppm, urea at 10 % and Zn SO_4 at 25% gave the highest effect in this respect followed by Dormex (hydrogen cyanamide) at all used concentrations, KNO_3 at 5% and NAA at 25 and 250 ppm in a descending order, during the two seasons of study .

Also spraying dates effected significantly cluster stem percentage, since the earlier date showed the least percentage, while three other dates were statistically the same during both seasons

Furthermore Tables (21 and 22) showed that the effect of interaction between agent used and spraying dates . Meanwhile spraying GA_3 at 1000 ppm and urea at 10% at all spraying dates and GA_3 at 50 ppm at later dates (15 January and February 1st) and KNO_3 at 5% at February 1st had the greatest values of cluster stem percentage during the two seasons of study

While NAA at low and high (25 and 250 ppm) concentrations had the lowest values in this respect than the other used agents, at all dates of spraying.

IV.5.7. Cluster length

It is clear from Tables (23 a and b & 24 a and b) that cluster length was greatly affected by various treatments used. Since spicific effect of agent used showed that all treatments except Dormex (hydrogen cyanamide) significantly increased cluster length than the control during two seasons of study regardless of the spraying date.

Furthermore GA_3 at low (50 ppm) and high (1000 ppm) concentration and zinc sulphate at 25% gave the highest significant effect in this respect.

Wherease, Dormex (hydrogen cyanamide) application decreased cluster length than the control especially the lower concentration (1.25 %).

These results may be atributed to the effect of Zinc on cell division and cell elongation through its effect on carbohydrates and protein synthesis *(Yagodin 1982)*.

Furthermore El-Shahat (1992) indicated that spraying Thompson Seedless grapevines with GA_3 at 500 ppm and 20% Zinc sulphate at dormancy increased cluster length .

Refferring the specific effect of spraying date on cluster leangth data obtained declared obviously that both two later dates enhanced it significantly than two other ones.

Regarding the effect of interation between a gent and spraying date. Data in Tables (23 a and b & 24 a and b) also revealed that application of GA_3 at 50 and 1000 ppm and Zn SO_4 at 25% at all dates of spraying had the longest clusters, during the two seasons of study. Conversely spraying vines with Dormex (hydrogen cyanamide) at 1.25, 2.5 and 5.0%) on 15 December and January 1st showed the lowest value of cluster length during two season of study .

IV.5.8-Cluster Width

Regarding the specific effect of agents used and praying dates on cluster width , data in Tables (23 a and b & 24 a and b) showed that all

treatments used except Dormex (hydrogen cyanamide) significantly decreased cluster width than the control during the two seasons of study, with respect to specific effect of spraying date on cluster width, it was quite evident that is was increased by delaying application date. However such increase was not significant in 1st season but it was more pronounced and reached levely significance in 2nd season.

Concerning the effect of interaction between agents used and spraying date data, in Tables (23 a and b & 24 a and b) also declared that spraying Thompson Seedless with Dormex (H_2CN_2) at 1.25% on Feb . 1st and at 5% on Jan.1st ,15 and Zn SO_4 at 25% on Jan. 1st increased cluster width over the control and other treatments, in the first season while in the second season spraying with 2.5 % Dormex (H_2CN_2) at 1 and 15 Jan. and with 5 % Dormex (H_2CN_2) at 15 Jan and Feb 1st and with 25% $ZnSO_4$ at Jan . 1st increased cluster width over the control and other treatments.

On the other hand generally spraying Thompson Seedless grapevines with NAA at 25 and 250 ppm at all dates of spraying used gave the lowest values in this respect, during the two seasons of study .

IV.5.9-Juice Percentage :

Regarding the specific effect of agents used and spraying date on Juice percentage data in Tables (23 a and b & 24 a and b) showed that only spraying Thompson Seedless grapevines with GA_3 at 1000 ppm after Winter pruning at dormant period significantly decreased juice percentage in comparison with the control and other treatments during the two seasons of study.While KNO_3 application at 5% gave the highest values in this respect in the two seasons of study .

Concerning the specificl effect of spraying dates data also declared that all dates of spraying did not effect juice percentage , during the two seasons of study .

Table (23a) : Effect of some growth regulators and nutrient elements on some physical properties (cluster length and width in cm) of Thompson Seedless grapevines fruits during 1993/1994 season.

Treatments \ Date of spraying	Cluster length (CM)					Cluster width (CM)				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	19.3	19.3	19.3	19.3	19.3	14.7	14.7	14.7	14.7	14.7
H_2CN_2 1.25%	14.3	17.8	17.3	17.3	15.9	12.7	13.7	14.0	15.7	14.0
$H_2 CN_2$ 2.5%	17.3	18.7	19.3	19.3	18.4	12.7	13.3	13.0	14.7	13.4
H_2CN_2 5.0%	18.3	18.7	19.7	19.6	19.1	13.0	16.0	15.3	14.3	14.7
GA_3 50 ppm	24.3	22.0	27.7	26.7	25.2	12.3	14.0	11.3	11.3	12.3
GA_3 1000 ppm	28.3	29.0	28.7	28.7	28.7	12.7	11.7	13.0	12.0	12.3
NAA 25 ppm	23.3	22.0	23.3	25.0	23.4	12.1	12.3	12.3	12.0	12.20
NAA 250 ppm	23.0	23.3	22.3	26.3	23.8	12.3	12.7	12.6	12.2	12.40
KNO_3 5%	23.3	21.0	25.7	24.3	23.6	12.0	13.0	12.3	13.3	12.70
Zn SO_4 25%	25.6	24.7	21.3	24.3	24.0	13.0	15.3	11.7	14.3	13.60
Urea 10 %	23.3	24.3	25.0	21.0	23.4	12.3	14.0	12.3	14.3	13.30
* Averages	21.8	21.5	22.7	22.9		12.7	13.7	13.0	13.5	

LS.D at 0.05 for :		
Date	0.75	0.82
Treatments	1.25	1.40
Date X Treatments	2.50	2.70

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (23b) : Effect of some growth regulators and nutrient elements on some physical properties (juice and peel %) of Thompson Seedless grapevines fruits during 1993/1994 season.

Date of spraying / Treatments	Juice %					Peel %				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	93.8	93.8	93.8	93.8	93.8	6.2	6.2	6.2	6.2	6.2
H_2CN_2 1.25%	93.3	93.4	93.5	93.3	93.4	6.7	6.6	6.5	6.7	6.6
$H_2 CN_2$ 2.5%	93.5	93.4	93.3	93.4	93.4	6.5	6.6	6.7	6.6	6.6
H_2CN_2 5.0%	93.4	93.4	93.2	93.2	93.3	6.6	6.6	6.8	6.8	6.7
GA_3 50 ppm	92.7	92.5	92.5	92.1	92.4	7.3	7.5	7.5	7.9	7.6
GA_3 1000 ppm	91.7	91.3	91.3	90.4	91.2	8.3	8.7	8.7	9.6	8.8
NAA 25 ppm	93.5	93.5	93.6	93.6	93.5	6.5	6.5	6.4	6.4	6.5
NAA 250 ppm	93.5	93.5	93.5	93.3	93.4	6.5	6.5	6.5	6.7	6.6
KNO_3 5%	94.7	94.8	94.8	94.6	94.7	5.3	5.2	5.2	5.4	5.3
Zn SO_4 25%	93.8	93.7	93.7	93.3	93.6	6.2	6.3	6.3	6.7	6.4
Urea 10 %	93.1	93.0	93.0	92.6	93.0	6.9	7.0	7.0	7.4	7.08
* Averages	93.4	93.3	93.3	93.1		6.6	6.7	6.7	6.9	

LS.D at 0.05 for :		
Date	1.1	0.5
Treatments	2.3	0.8
Date X Treatments	3.2	1.70

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (24a) : Effect of some growth regulators and nutrient elements on some physical properties (cluster length and width in cm) of Thompson Seedless grapevines fruits during 1994/1995 season.

Date of spraying / Treatments	Cluster length (CM)					Cluster width (CM)				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	19.7	19.7	19.7	19.7	19.7	13.3	13.3	13.3	13.3	13.3
H_2CN_2 1.25%	13.3	15.7	17.0	18.3	16.1	10.3	11.7	13.3	12.7	12.0
H_2 CN_2 2.5%	15.7	16.3	17.0	19.3	17.1	13.7	14.3	14.3	13.7	14.0
H_2CN_2 5.0%	14.3	15.3	17.7	19.3	16.7	13.0	13.2	14.4	13.8	13.6
GA_3 50 ppm	25.3	23.0	24.3	24.3	24.2	9.7	11.0	10.3	11.0	10.5
GA_3 1000 ppm	26.7	26.0	27.0	25.0	26.2	9.9	11.3	10.3	12.0	10.9
NAA 25 ppm	21.0	21.3	23.3	20.7	21.6	9.0	9.3	10.7	12.0	10.3
NAA 250 ppm	25.3	26.0	23.7	23.3	24.6	9.0	9.0	8.7	9.0	8.9
KNO_3 5%	23.3	22.3	24.7	25.0	23.8	10.0	9.0	11.7	10.7	10.4
Zn SO_4 25%	27.7	25.7	25.0	26.7	26.3	13.0	13.5	13.1	13.2	13.2
Urea 10 %	21.3	21.7	23.3	23.3	22.4	8.7	10.0	11.7	12.3	10.7
* Averages	21.24	21.18	22.1	22.26		10.8	11.42	11.41	12.16	

LS.D at 0.05 for :

Date	0.80	0.61
Treatments	1.70	1.01
Date X Treatments	2.80	2.03

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (24b) : Effect of some growth regulators and nutrient elements on some physical properties (juice and peel %) of Thompson Seedless grapevines fruits during 1994/1995 season.

Treatments \ Date of spraying	Juice %					Peel %				
	15/12	1/1	15/1	1/2	Av**	15/12	1/1	15/1	1/2	Av**
Control	93.4	93.4	93.4	93.4	93.4	6.60	6.60	6.60	6.60	6.60
H_2CN_2 1.25%	93.2	93.2	93.2	93.2	93.2	6.80	6.8	6.7	6.8	6.8
$H_2 CN_2$ 2.5%	93.1	92.9	92.8	92.7	92.9	6.90	7.1	7.2	7.3	7.1
H_2CN_2 5.0%	92.9	92.8	92.6	92.4	92.7	7.1	7.2	7.4	7.6	7.3
GA_3 50 ppm	92.7	92.6	92.4	92.2	92.5	7.3	7.4	7.6	7.8	7.5
GA_3 1000 ppm	91.5	91.3	91.0	90.7	91.1	8.5	8.7	9.0	9.3	8.9
NAA 25 ppm	93.3	93.3	93.3	93.3	93.3	6.7	6.7	6.7	6.7	6.7
NAA 250 ppm	93.2	93.2	93.3	93.2	93.2	6.8	6.8	6.8	6.7	6.8
KNO_3 5%	94.8	94.6	94.8	94.9	94.8	5.2	5.3	5.2	5.1	5.2
Zn SO_4 25%	93.6	93.6	93.3	93.2	93.4	6.4	6.4	6.7	6.8	6.6
Urea 10 %	93.2	93.0	92.8	92.5	92.9	6.8	7.0	7.2	7.0	7.1
* Averages	93.2	93.1	93.0	92.9		6.8	6.9	7.0	7.0	

LS.D at 0.05 for :		
Date	1.20	0.60
Treatments	2.50	0.90
Date X Treatments	3.40	1.80

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Regarding the effect of interaction between agents used and spraying dates, data in Tables (23 a and b & 24 a and b) also revealed that in general spraying Thompson Seedless grapevines with GA_3 at 1000 and 50 ppm at all dates of spraying decreased juice percentage than the other treatments used and the control , during the two seasons of study .

On the other hand KNo_3 application at 5% at all dates of spraying gave the highest values in this respect during the two seasons of study

IV.5.10-Peel Percentage :

Regarding the effect of some growth regulators and nutrient elements on peel percentage, data in Tabels (23 a and b & 24 a and b) showed that GA_3 application at low and high concentrations (50 and 1000 ppm) gave the highest peel percentage during the two seasons of study , followedl by urea application at 10%, Dormex (hydrogen cyanamide) at all concentrations (i.e 1.25, 2.5 and 5%). NAA at 25 and 250 ppm and 25% $Zn\ So_4$. All these treatments increased peel percentage over the control .

On the other hand Kno_3 application at 5% significantly decreased peel percentage in comparison with the control and other used agents, during the two seasons of study .

Concerning the specific effect of spraying dates on peel percentage, data showed that delaying sprays increased it slightly during the two seasons of study . The increment was not significantly .

Also the interaction between agents used and spraying dates, Data declard that spraying Thompson Seedless grapevines with GA_3 at 50 and 1000 ppm at 15 Jan . and Feb . 1^{st} gave the highest peel percentage during the two seasons of study . On the other hand Kno_3 application at 5% at all dates of spraying (i-e 15 Dec., 1 and 15 Jan . and Feb . 1^{st}) gave the lowest values in this respect during the two seasons of study .

IV.6.CHEMICAL CONTENTS OF BERRIES:

IV.6.1- Total soluble solids (T.S.S)

Data in Tables (25,26,27,28,29,30,31 and 32) show the changes in the total soluble solids percentage in berry juice of sprayed grapevines at successive dates in the two seasons of investigation to determine harvesting dates, in relation to the effect of different treatments at every date of spraying.

The data, generally show that spraying Thompson Seedless grapevines at dormant season with Dormex (H_2CN_2) at 1.25, 2.5 and 5.0%, KNO_3 at 5% and urea at 10% increased T.S.S. values in comparison with the control and other treatments, during the two seasons of study.

On the other hand GA_3 at 50 and 1000 ppm concentration gave lower values in this respect than the control .

Furthermore NAA application at 25 and 250 ppm and Zn SO_4 at 25% less effect in this respect.

The increasing T.S.S percentage in juice of grape berries by using Dormex (N_2CH_2) treatments was previously reported by ***Jordan (1985 /1986)*** working on Italia and Black Alicante grapevines, ***Ahmed (1993)*** on Romi Red grapevines ***and Sourial et. al. (1993c)*** on Thompson Seedless grapevines and regarding the effect of GA_3 our results go in line with finding of ***Samra (1982) and El - Shahat (1992)*** who found that GA_3 application at dormant season decreased T.S.S. percentage of berry juice of Thompson Seedless grape.

Also data declared that an earlier crop of high priced Thompson Seedless grapes for consumption as atable grape could be obtainad in the first season at 15 at 25 June by spraying Dormex (H_2CN_2) at dormant season and at 30 June to 10 July by using KNO_3 at 5% and from 5 to 10 July by using urea at 10% . These variations were depended upon the

Table (25) : Effect of some growth regulators and nutrient elements applied on 15 Dec. on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1993/1994 season.

Treatments	T.S.S. % in berry juice at :													
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20/7	25/7
Control				6.1	6.7	9.4	10.2	12.0	13.4	14.6	15.1	16.2		
H_2CN_2 1.25%	6.0	6.6	9.8	10.9	11.6	13.0	14.8	16.6	18.2	19.8	21.0	22.1		
H_2 CN_2 2.5%	6.0	6.4	9.7	10.8	11.3	12.8	14.7	16.4	18.1	20.3	21.2	22.3		
H_2CN_2 5.0%	6.0	6.5	9.8	10.7	11.2	10.7	14.8	16.5	19.3	20.7	21.6	22.4		
GA_3 50 ppm				6.0	6.5	7.0	7.6	9.2	11.3	12.3	13.6	14.3	15.6	16.7
GA_3 1000 ppm				5.8	6.6	7.2	9.6	10.8	11.7	12.8	13.9	14.8	16.8	
NAA 25 ppm				6.2	6.8	9.5	10.4	11.8	12.9	13.8	14.9	15.8	16.9	
NAA 250 ppm				6.3	6.7	9.8	10.6	11.9	12.9	14.0	14.8	15.9	17.0	
KNO_3 5%				6.0	8.6	9.6	12.3	13.6	15.4	17.0	18.1	19.9		
Zn SO_4 25%				6.0	6.7	7.6	9.8	10.2	11.4	12.8	14.4	15.7	17.1	
Urea 10 %				6.4	7.1	10.0	11.8	13.3	14.2	15.8	17.0	19.0		

Table (26) : Effect of some growth regulators and nutrient elements applied on Jan. 1st on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1993/1994 season.

Treatments	T.S.S. % in berry juice at :													
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20/7	25/7
Control				6.1	6.7	9.4	10.2	12.0	13.4	14.6	15.1	16.2		
H_2CN_2 1.25%	6.0	6.7	7.4	12.6	14.4	15.6	16.9	17.9	19.3	20.8	21.4	22.2		
$H_2 CN_2$ 2.5%	6.1	6.6	7.5	12.9	14.5	15.4	16.0	16.8	18.9	21.0	21.7	22.3		
H_2CN_2 5.0%	6.1	6.8	7.6	12.7	14.2	15.3	16.0	16.6	19.1	20.9	21.8	22.5		
GA_3 50 ppm				6.0	6.4	7.1	7.9	10.3	11.7	12.8	13.7	14.8	15.6	16.2
GA_3 1000 ppm				6.0	6.8	7.9	10.4	11.0	11.9	13.0	14.2	15.4	16.1	
NAA 25 ppm				6.2	7.0	9.9	10.8	11.9	13.0	14.7	15.3	16.1		
NAA 250 ppm				6.3	7.1	10.0	11.0	11.8	13.2	14.9	15.6	17.2		
KNO_3 5%				7.6	10.5	11.7	12.9	13.8	14.9	15.6	17.1	20.1		
Zn SO_4 25%				6.0	6.8	7.9	10.8	11.9	12.8	14.1	15.0	15.5	16.1	
Urea 10 %				7.7	10.8	12.1	13.6	14.8	15.6	17.2	18.0	18.9		

Table (27) : Effect of some growth regulators and nutrient elements applied on 15 Jan. on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1993/1994 season.

Treatments	T.S.S. % in berry juice at :													
	20/5	25/5	30/5	5.6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20/7	25/7
Control				6.1	6.7	9.4	10.2	12.0	13.4	14.6	15.1	16.2		
H_2CN_2 1.25%	6.3	9.6	11.1	13.2	14.7	15.8	16.7	17.9	19.3	20.9	21.7	22.3		
$H_2 CN_2$ 2.5%	6.5	9.7	11.3	12.8	13.9	15.5	16.8	18.1	19.8	21.0	21.8	22.6		
H_2CN_2 5.0%	6.4	9.6	11.0	12.6	13.5	14.9	15.6	16.6	20.1	21.4	22.2	23.1		
GA_3 50 ppm				5.8	6.8	7.6	9.8	10.9	11.8	12.9	13.8	14.9	15.8	17.1
GA_3 1000 ppm				5.2	6.5	7.5	10.0	11.0	12.2	13.6	14.3	15.4	17.3	
NAA 25 ppm				5.9	6.7	7.8	9.9	11.0	11.9	13.1	14.0	14.9	15.9	17.2
NAA 250 ppm				5.8	6.8	8.0	10.2	11.4	12.3	13.9	14.8	15.4	17.1	
KNO_3 5%				7.2	10.8	12.9	14.8	15.6	17.1	18.1	19.2	20.1		
Zn SO_4 25%				6.1	7.2	10.6	11.9	12.8	13.7	14.9	15.7	17.2		
Urea 10 %				6.5	10.7	11.9	13.2	14.7	15.8	16.8	17.9	19.2		

Table (28) : Effect of some growth regulators and nutrient elements applied on Feb. 1st on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1993/1994 season.

Treatments	T.S.S. % in berry juice at :													
	20/5	25/5	30/5	5.6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20/7	25/7
Control				6.1	6.7	9.4	10.2	12.0	13.4	14.6	15.1	16.2		
H_2CN_2 1.25%	6.5	7.2	10.2	13.0	14.8	15.7	16.8	17.7	18.6	19.7	20.9	21.9		
$H_2 CN_2$ 2.5%	6.7	10.5	12.4	13.8	14.9	16.6	17.0	18.2	19.4	20.8	21.6	22.5		
H_2CN_2 5.0%	6.3	10.1	12.1	13.6	15.6	16.7	17.3	19.0	20.6	21.4	22.0	23.0		
GA_3 50 ppm				6.4	7.2	9.7	10.6	11.8	12.4	13.7	14.9	15.8	17.2	
GA_3 1000 ppm				6.5	7.4	10.2	11.7	12.6	13.8	14.7	15.8	17.2		
NAA 25 ppm				5.7	6.8	7.7	10.0	11.1	12.1	13.3	14.8	15.8	17.1	
NAA 250 ppm				6.2	7.3	9.8	10.2	11.3	12.4	13.5	14.9	15.7	16.9	
KNO_3 5%				7.5	11.0	12.2	13.3	14.2	15.4	17.2	18.5	20.0		
Zn SO_4 25%				6.4	7.3	11.0	12.1	13.2	14.0	14.8	15.2	16.8		
Urea 10 %				6.2	10.8	12.0	13.3	14.6	15.6	17.1	18.0	18.6		

Table (29) : Effect of some growth regulators and nutrient elements applied on 15 Dec. on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1994/1995 season.

Treatments	T.S.S. % in berry juice at :											
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7
Control			5.8	6.5	9.8	10.3	11.2	12.3	13.8	15.3	16.6	
H_2CN_2 1.25%	6.2	7.4	12.2	14.1	15.6	16.6	17.7	19.0	20.5	21.6	22.2	
$H_2 CN_2$ 2.5%	6.0	10.1	12.8	14.5	15.7	16.9	17.8	19.7	21.0	21.8	22.4	
H_2CN_2 5.0%	5.8	7.2	10.6	14.3	15.5	16.7	18.0	19.6	20.8	21.6	22.3	
GA_3 50 ppm					6.6	7.4	10.2	11.4	12.7	14.0	15.1	16.4
GA_3 1000 ppm				6.2	7.1	10.1	11.0	11.7	13.2	14.8	15.6	16.8
NAA 25 ppm			6.4	7.3	10.6	11.3	12.4	13.3	14.2	15.8	17.1	
NAA 250 ppm			6.6	7.5	10.8	11.5	12.7	13.9	15.0	15.8	17.3	
KNO_3 5%		6.2	7.4	10.8	12.1	13.6	14.8	15.7	16.6	18.4	21.8	
$Zn SO_4$ 25%				5.8	6.6	7.8	10.6	11.7	12.9	14.1	15.3	16.3
Urea 10 %		6.4	7.7	10.9	12..0	13.8	14.7	15.7	16.8	18.3	21.6	

Table (30) : Effect of some growth regulators and nutrient elements applied on Jan. 1st on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1994/1995 season.

Treatments	T.S.S. % in berry juice at :												
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20.7
Control			5.8	6.5	9.8	10.3	11.2	12.3	13.8	15.3	16.6		
H_2CN_2 1.25%	6.3	7.6	12.3	13.3	14.8	15.7	16.1	17.8	19.3	21.1	22.1		
$H_2 CN_2$ 2.5%	6.1	10.3	12.7	13.9	15.0	15.8	16.9	18.0	19.6	21.1	22.3		
H_2CN_2 5.0%	6.0	9.8	11.4	13.7	14.8	15.7	16.8	17.7	19.2	21.2	22.1		
GA_3 50 ppm					6.5	7.2	9.7	10.6	11.9	13.0	13.8	14.9	16.7
GA_3 1000 ppm					6.7	9.8	10.3	11.4	12.5	13.7	14.0	15.7	17.1
NAA 25 ppm				6.7	7.4	10.8	11.7	12.8	13.9	14.9	15.9	17.0	
NAA 250 ppm				6.8	7.7	11.0	11.9	13.0	13.8	15.0	15.8	17.1	
KNO_3 5%	6.4	7.7	11.0	12.3	14.2	15.8	17.1	18.9	20.7	21.3	22.2		
Zn SO_4 25%				6.0	6.7	10.7	11.6	13.0	13.8	14.9	15.8	16.9	
Urea 10 %		6.5	8.0	10.8	12.2	13.8	15.0	16.7	18.0	19.1	22.1		

Table (31) : Effect of some growth regulators and nutrient elements applied on 15 Jan. on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1994/1995 season.

Treatments	T.S.S. % in berry juice at :												
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20.7
Control			5.8	6.5	9.8	10.3	11.2	12.3	13.8	15.3	16.6		
H_2CN_2 1.25%	6.4	7.4	11.8	13.2	14.7	16.6	17.7	18.9	20.1	21.3	22.4		
$H_2 CN_2$ 2.5%	6.5	10.8	12.4	14.1	15.3	16.7	17.9	19.4	20.6	21.5	20.7		
H_2CN_2 5.0%	6.2	7.3	11.7	13.3	14.9	16.5	17.2	18.8	20.3	21.2	22.3		
GA_3 50 ppm					6.4	7.1	8.0	10.6	11.7	12.8	14.1	15.3	16.5
GA_3 1000 ppm					7.6	7.4	8.2	10.7	11.9	13.0	14.3	15.6	17.0
NAA 25 ppm					6.6	7.2	8.1	10.9	12.1	13.3	14.2	15.8	16.9
NAA 250 ppm					6.7	7.4	8.2	11.0	12.3	13.4	14.4	15.8	17.0
KNO_3 5%		6.5	7.9	11.3	12.8	14.1	15.6	17.2	19.7	20.2	22.0		
Zn SO_4 25%					6.7	7.8	11.0	11.8	13.7	14.8	15.7	16.6	
Urea 10 %		6.3	7.8	11.1	12.3	13.9	15.0	15.8	17.1	19.3	21.8		

Table (32) : Effect of some growth regulators and nutrient elements applied on Feb. 1st on dynamics of total soluble solids in berry juice of Thompson Seedless grapevines during 1994/1995 season.

Treatments	T.S.S. % in berry juice at :												
	20/5	25/5	30/5	5/6	10/6	15/6	20/6	25/6	30/6	5/7	10/7	15/7	20.7
Control			5.8	6.5	9.8	10.3	11.2	12.3	13.8	15.3	16.6		
H_2CN_2 1.25%	6.3	10.4	12.1	13.4	14.8	16.7	18.4	19.7	20.6	21.1	22.0		
$H_2 CN_2$ 2.5%	6.6	10.8	12.6	14.3	17.1	17.9	18.5	20.1	21.0	21.8	22.5		
H_2CN_2 5.0%	6.4	10.3	12.4	14.1	16.8	17.7	18.2	19.6	20.8	21.6	22.2		
GA_3 50 ppm				6.3	7.2	9.9	11.1	12.2	13.7	14.5	15.6	16.6	
GA_3 1000 ppm				6.8	8.0	10.7	11.3	12.4	13.9	14.8	15.7	16.8	
NAA 25 ppm					7.1	8.2	10.2	11.7	12.9	14.8	15.7	16.8	
NAA 250 ppm					7.3	8.5	10.8	11.9	13.1	14.9	15.8	17.1	
KNO_3 5%	6.2	7.2	10.0	12.1	13.9	15.1	16.9	18.4	19.8	20.4	21.8		
Zn SO_4 25%					6.1	7.5	11.3	12.3	13.9	15.0	15.8	16.9	
Urea 10 %		7.0	8.2	11.3	12.6	13.9	15.0	16.8	18.6	19.4	21.0		

spraying date as compared with the control which harvested at 15 July (T.S.S 16 and more) .

IV.6.2- T.S.S at Harvesting date : -

Also data in Tables (33 a and b & 34 a and b) show the specific effect of agent used and spraying date on T.S.S. percentage and its interaction. Data declared that spraying Thompson Seedless grapevines with Dormex (H_2CN_2) at all used concentrations (i-e 1.25, 2.5 and 5%), KNO_3 at 5% and urea at 10% gave significantly the highest values of T.S.S in comparison with the control and other used treatments, regardles of the spraying date during the two seasons of study.While GA_3 application at 50 and 1000 ppm, NAA at 25 and 250 ppm and Zn SO_4 at 25% gave the lowest values in this respect.

Regarding the specific effect of spraying. date on T.S.S % , data revealed that T.S.S % was gradually increased as sprays was delayed in 1st season, while in 2nd season it did not respond.

Tables (33 a and b & 34 a and b) also shows the effect of interaction between agents used and spraying dates on T.S.S Percentage data revealed that spraying Dormex (H_2CN_2) at all used concentrations (i-e1.25, 2.5 and 5%), KNO_3 5% and urea at 10% had the greatest values of T.S.S of berry juice percentage all over the dates of spraying during the two seasons of study. On the other hand spraying grapevines with GA_3 at 50 and 1000 ppm and Zn SO_4 at 25% at all spraying dates had lowest values in this respect during the two seasons of study . Similar results were found by ***Jordan (1985 and 1986)*** .

Mc Coll (1986), Ahmed (1993) and Sourial et. al. (1993). They found that hydrogen cyanamide increased T.S.S percentage of berry juice of studied grape varieties .

Furthermore El- Shahat (1992) reported that spraying Thompson Seedless grapevines at dormant season with GA_3 at 500 ppm reduced T.S.S. percentage.

IV.6.3- Sugar Percentage :

Regarding the specific effect of the two factors involved in this study i-e agents used and spraying date on sugar percentage, data in Tables (33 a and b & 34 a and b) showed that spraying Thompson Seedless grapevines with Dormex (H_2CN_2) at all used concentrations (i-e 1.25, 2.5 and 5%), KNO_3 at 5% and urea at 10% gave significantly the highest sugar percentage in comparison with the control and other treatmetns regardless of the spraying date during the two seasons of study .

While GA_3 application at 50 and 1000 ppn, NAA at 25 and 250 ppm and Zn SO_4 at 25% gave the lowest values in this respect.

As the berry juice total sugars % in relation to specific effect of spraying date, it could be noticed two opposite trends were detacted in this respect.

The first i-e in 1993 / 1994 season showed that sugar % was increased by delaying sprays to later dates, while the reverse was true in the second season.

Tables (33 a and b &34 a and b) also shows the effect of interaction between agent used and spraying date on sugar percentage, data revealed that spraying Dormex (H_2CN_2) at all used concentrations (i-e 1.25, 2.5 and 5%) at all spraying dates had the highest values of sugar percentage, during the two seasons of study followed in descending order by KNO_3 at 5% and urea at 10% .

On the other hand spraying Thompson Seedless grapevines with GA_3 at 50 and 1000 ppm, NAA at 25 and 250 ppm and Zn SO_4 at 25% at all spraying dates had the lowest values in this respect during the two seasons of study .

IV.6.4- Total Acidity at Harvest Time :

Concerning the specific effect of agents and spraying date on acidity of berry juice data as shown in Tables (33 a and b & 34 a and b) revealed that spraying grapevines at dormant season with Dormex (H_2CN_2) at all used concentrations (i-e 1.25, 2.5 and 5.0%), KNO_3 at 5% decreased significantly acidity percentage at harvest date than control regardless of the spraying date during the two seasons of study .

On the contrary the application of GA_3 at 50 and 1000 ppm and NAA at 25 and 250 ppm at dormancy significantly increased the total a cidity in berry juice than the control and other treatmetns at harvesting date of the control vines in the two seasons of study .

The effect of interaction between agents used and spraying date on acidity of berry juice, data revealed that spraying Dormex (H_2CN_2) and KNO_3 at all spraying dates decreased significantly the acidity percentage during the two seasons of study .

While GA_3 application and NAA took the reverse effect in this respect in the two seasons of study .

The obtained results concerning acidity percentage are in harmony with ***Jordan (1985 / 1986)*** who mentioned that hydrogen cyanamide decreased acidity of Italia and Black Alicante berries and ***Sourial et. al. (1993)*** they found that application of hydrogen cyanamide on Thompson Seedless grapevines decreased berries acidity. Furthermore ***El - Shahat (1992)*** found that GA_3 application at 500 ppm at dormant season significantly increased total acidity of Thompson Seedless grape berries than the control .

Furthermore the obtained results concerning T.S.S and acidity percentage might be attributed to advanced and delayed budburst and consequently all subsequent stages of yearly growth cycle.

As application of Dormex ($H_2 CN_2$), KNO_3 and urea advanced berry ripening which implies increments in T.S.S and reduction in acidity. While GA_3 and NAA delayed ripening which caused reduction in T.S.S at harvest date of control vines and increased a cidity .

IV.6.5. T.S.S / Acid Ratio :-

Regarding the specific effect of agents used and spraying date on T.S.S / acid ratio, Tables (33 a and b & 34 a and b) clearly show that application of Dormex (H_2CN_2), KNO_3 and urea induced the highest value of T.S.S / acid ratio regardless of the spraying date during the two seasons of study . While application of GA_3, NAA and Zn SO_4 had the lowest value in this respect, during the two seasons of study, the differences between each of those treatments and the control were statistically significant.

Also data indicates the interaction between agents used and spraying date on T.S.S / acid ratio where sprayed grapevines with Dormex (H_2CN_2) at all used concentrations (i-e 1.25, 2.5 and 5.0%), KNO_3 at 5% and urea at 10% at all dates of spraying during dormant season gave the highest T.S.S / acid ratio during the two season of study . While GA_3 application at 50 and 1000 ppm and Zn SO_4 at 25% at all spraying dates and NAA at the two later dates (i-e. 15 January and February 1st) had the lowest values in this respect. Similar results were found by ***Sabry (1994) and Abdel - All (1996)*** they found that spraying grapevines at dormant season with Dormex (H_2CN_2) increased T.S.S / acid ratio over the control . On the other hand ***El - Shahat (1992)*** found that application of GA_3 at 500 ppm at dormant season reduced T.S.S / acid ratio of Thompson Seedless grape than all used treatments and control.

Table (33a) : Effect of some growth regulators and nutrient etements on some chemical characteristics (T.S.S and sugar %) of Thompson Seedless grapevines berries contents at harvesting date of control vines (15 July) during 1993/1994 season.

Treatments \ Date of spraying	T.S.S %					Sugar %				
	15/12	1/1	15/1	1/2	Average**	15/12	1/1	15/1	1/2	Average**
Control	16.2	16.2	16.2	16.2	16.2	15.6	15.6	15.6	15.6	15.6
H_2CN_2 1.25%	22.1	22.2	22.3	21.9	22.13	21.5	21.3	21.0	20.3	21.03
$H_2 CN_2$ 2.5%	22.3	22.3	22.6	22.5	22.43	21.1	21.0	21.1	21.0	21.05
H_2CN_2 5.0%	22.4	22.5	23.10	23.0	22.75	21.2	21.0	21.4	21.2	21.20
GA_3 50 ppm	14.3	14.8	14.9	15.8	14.95	13.1	13.7	13.7	14.8	13.83
GA_3 1000 ppm	14.8	15.4	15.4	17.2	15.70	14.3	14.6	14.5	16.1	14.88
NAA 25 ppm	15.8	16.1	14.9	15.8	15.65	14.9	15.3	13.3	14.7	14.55
NAA 250 ppm	15.9	17.2	15.4	15.7	16.06	15.1	16.1	14.5	14.6	15.08
KNO_3 5%	19.9	20.1	20.1	20.0	20.03	18.2	18.4	18.3	18.3	18.30
$Zn SO_4$ 25%	15.7	15.5	17.2	16.8	16.30	14.8	14.6	16.0	15.6	15.25
Urea 10 %	19.0	18.9	19.20	16.6	18.93	17.9	17.6	17.8	17.4	17.68
* Averages	18.04	18.28	18.30	18.5		17.06	17.18	17.01	17.24	

LS.D at 0.05 for :		0.20
Date	0.22	0.90
Treatments	0.48	2.70
Date X Treatments	0.75	

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (33 b) : Effect of some growth regulators and nutrient etements on some chemical characteristics (acidity and T.S.S / Acid ratio) of Thompson Seedless grapevines berries contents at harvesting date of control vines (15 July) during 1993/1994 season.

Date of Spraying / Treatments	Acidity %					T.S.S / Acid ratio				
	15/12	1/1	15/1	1/2	Average**	15/12	1/1	15/1	1/2	Average**
Control	0.62	0.62	0.62	0.62	0.62	26.13	26.13	26.13	26.13	26.13
H_2CN_2 1.25%	0.52	0.52	0.51	0.55	0.53	42.5	42.69	43.73	39.82	42.19
$H_2 CN_2$ 2.5%	0.52	0.50	0.50	0.54	0.52	42.88	44.60	43.20	41.67	43.09
H_2CN_2 5.0%	0.51	0.50	0.48	0.55	0.51	43.92	45.0	48.13	41.82	44.72
GA_3 50 ppm	0.88	0.85	0.86	0.82	0.86	16.25	17.41	17.33	19.27	17.57
GA_3 1000 ppm	0.84	0.82	0.84	0.86	0.79	17.62	17.62	18.33	26.6	20.20
NAA 25 ppm	0.82	0.75	0.85	0.84	0.82	19.27	21.47	17.52	18.81	19.27
NAA 250 ppm	0.76	0.65	0.83	0.82	0.77	20.92	26.46	18.55	19.15	21.27
KNO_3 5%	0.54	0.55	0.54	0.55	0.55	36.85	36.55	37.22	36.36	36.75
Zn SO_4 25%	0.82	0.82	0.67	0.65	0.66	19.15	18.90	25.67	25.85	22.39
Urea 10 %	0.61	0.61	0.64	0.60	0.62	31.15	30.98	30.0	31.0	30.78
* Averages	0.68	0.65	0.67	0.61		28.79	29.93	29.61	29.63	

LS.D at 0.05 for :		
Date	0.02	0.55
Treatments	0.04	1.25
Date X Treatments	0.06	2.70

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).

Table (34 a) : Effect of some growth regulators and nutrient etements on some chemical characteristics (T.S.S and sugar %) of Thompson Seedless grapevines berries contents at harvesting date of control vines (10 July) during 1994/1995 season.

Date of spraying / Treatments	T.S.S %					Sugar %				
	15/12	1/1	15/1	1/2	Average**	15/12	1/1	15/1	1/2	Average**
Control	16.6	16.6	16.6	16.	16.6	15.7	15.7	15.7	15.7	15.7
H_2CN_2 1.25%	22.2	22.1	22.4	22.0	22.18	21.05	21.1	21.3	20.8	21.06
$H_2 CN_2$ 2.5%	22.4	22.3	22.7	22.5	22.48	21.2	21.1	21.5	21.2	21.25
H_2CN_2 5.0%	22.3	22.1	22.3	22.2	22.23	21.2	21.3	21.1	21.1	21.18
GA_3 50 ppm	15.1	13.8	14.1	15.6	14.65	14.5	19.9	13.1	14.4	13.73
GA_3 1000 ppm	15.6	14.9	14.3	15.7	15.13	14.3	13.2	13.5	14.6	13.90
NAA 25 ppm	17.1	15.9	14.2	15.7	15.73	16.2	15.0	13.3	14.5	14.75
NAA 250 ppm	17.3	15.8	14.4	15.8	15.83	16.3	15.0	13.4	14.4	14.78
KNO_3 5%	21.8	22.2	22.0	21.8	21.95	17.6	21.0	21.1	20.3	20.5o
Zn SO_4 25%	15.3	15.8	15.7	15.8	15.65	14.6	14.7	14.5	14.9	14.68
Urea 10 %	21.6	22.1	21.8	21.0	21.63	19.7	21.1	20.4	19.8	15.25
* Averages	18.85	18.83	18.23	18.63		17.67	17.45	17.16	17.43	

LS.D at 0.05 for :

Date	**0.28**	**0.25**
Treatments	**0.65**	**0.58**
Date X Treatments	**0.92**	**0.85**

*** Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).**

Table (34 b) : Effect of some growth regulators and nutrient etements on some chemical characteristics (acidity and T.S.S / Acid ratio%) of Thompson Seedless grapevines berries contents at harvesting date of control vines (10 July) during 1994/1995 season.

Date of Spraying / Treatments	Acidity %					T.S.S / Acid ratio				
	15/12	1/1	15/1	1/2	Average**	15/12	1/1	15/1	1/2	Average**
Control	0.62	0.62	0.62	0.62	0.62	26.77	26.77	26.77	26.77	26.77
H_2CN_2 1.25%	0.52	0.52	0.50	0.56	0.52	44.40	42.50	44.80	39.29	42.75
$H_2 CN_2$ 2.5%	0.50	0.50	0.52	0.53	0.51	44.80	44.60	43.65	42.45	43.88
H_2CN_2 5.0%	0.50	0.52	0.51	0.52	0.51	44.60	42.50	43.73	42.69	43.38
GA_3 50 ppm	0.80	0.89	0.86	0.82	0.84	18.88	15.51	16.40	19.02	17.45
GA_3 1000 ppm	0.84	0.83	0.85	0.80	0.83	18.57	17.95	16.82	19.63	18.24
NAA 25 ppm	0.64	0.75	0.81	0.79	0.75	26.72	21.20	17.53	19.87	21.33
NAA 250 ppm	0.64	0.74	0.81	0.79	0.75	27.03	21.35	17.78	20.00	21.54
KNO_3 5%	0.52	0.53	0.53	0.60	0.55	41.13	41.89	41.51	36.33	40.22
Zn SO_4 25%	0.82	0.82	0.82	0.80	0.82	81.66	19.27	19.15	19.75	19.21
Urea 10 %	0.54	0.52	0.53	0.60	0.55	40.00	42.50	41.13	35.00	39.66
* Averages	0.63	0.66	0.67	0.68		32.20	30.66	29.93	29.19	

LS.D at 0.05 for :		
Date	0.02	0.55
Treatments	0.04	1.25
Date X Treatments	0.06	2.70

* Average and ** average reffer to row and columan indicating specific effect of spraying date and treatments (agents used).