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EFFECT OF CONCENTRATION AND APPLICATION DATE OF HYDROGEN CYANAMIDE (DORMEX) ON BUD BEHAVIOUR, GROWTH AND PRODUCTIVITY OF SUPERIOR GRAPEVINES

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ABSTRACT

This study was carried out to investigate the effect of Dormex sprayed at different concentrations and dates on bud behaviour, vegetative growth and yield of Superior grapevines. Three concentrations of Dormex were weekly sprayed: (0, 3 or 5%) at six dates: December 15th, December 22th, December 29th, January 5th, January 12th and January 19th.

It was evident from the results of the investigation that the best effective concentration of Dormex was 5%. The early Dormex application date (December 15th or December 22th) gave too early bud burst with irregular and low percentage of bud break and consequently the yield was very low. Moreover, the late Dormex application date (January 12th or January 19th) greatly increased percentage of bud burst and bud fertility coefficient as a result of which average number of bunches and yield per vine were obviously increased.

The medium Dormex application date (December 29th or January 5th) was recommended to achieve an early, uniform and high percentage of bud burst, in addition to, realizing reliable vegetative growth, and good yield with high bunch quality.

INTRODUCTION

"Superior" cultivar is an early-ripening cultivar, which ripens through the period from first to mid June. Earliness of Superior grapes is often accompanied by irregular and low percentage of bud break and consequently the yield is very low. These defects are thought to due to the insufficient chilling units required to induce full and uniform bud break. It is worth mentioning that no research work was available in the literature concerning the effect of Dormex on Superior grapevines.

Dormancy is a phase of development that occurs annually in deciduous fruit trees, (Saure, 1985). Release of dormancy requires a chilling period during winter followed by a temperature rise in spring (Fuchigami *et al.*, 1982).

In Egypt, insufficient chilling hours in winter lead to delaying leaf drop and many buds remain dormant as a result of which the blooming period is extended for a long time. Thus using dormancy breaking agents is a must. Domex (49%hydrogen cyanamide) is one of the most effective dormancy breaking agents for the grape and many deciduous fruit species which leads to earlier and more uniform bud burst, earlier fruit setting and early fruit ripening (Schulman *et al.*, 1983 and Dokoozlian *et al.*, 1995). The effectiveness of this chemical depends on rate and time of application, stage of bud development post application temperatures and amount of chilling

accumulated (Schulman *et al.*, 1986; El-Shazly, 1999 and El-Mogy *et al.*, 2002).

The objectives of this investigation is to find out the best concentration and time of Dormex spray to obtain an early, uniform and high percentage of bud burst. In addition, it's effect on vegetative growth, yield and bunch quality of Superior grapevines.

MATERIALS AND METHODS

This investigation was conducted in a private vineyard located at El-Khatatba, Menoufiya governorate on mature Superior grapevines. The study extended for two successive seasons (2005 and 2006). The vines were 8-year-old, grown in a sandy soil, spaced at 2 X 2.5 meters apart and irrigated by the drip irrigation system, cane-pruned and trellised by the "Y" shape system. The vines were pruned during the first week of December so as to leave (6 canes X 12 buds/cane). One hundred and fifty six uniform vines were chosen. Each four vines acted as a replicate and each three replicates were treated by one of the following treatments:-

Three concentrations of Dormex were weekly sprayed (0, 3 or 5%) at six dates: December 15th, December 22th, December 29th, January 5th, January 12thand January 19th.

The following parameters were determined to evaluate the tested treatments:-

1. Bud behaviour

Number of bursted out buds/vine was recorded, then the percentage was calculated by dividing number of bud burst per vine by the total number of buds per vine left at pruning at weekly intervals along the bursting period. Moreover, coefficient of bud fertility was calculated by dividing average number of bunches per vine by the total number of buds/vine according to Huglin (1958) and Bessis (1960).

2. Yield and physical characteristics of bunches

Yield/vine (kg) was determined as number of bunches/vine X average bunch weight (g).

Representative random samples of 6 bunches/vine were harvested at maturity when TSS reached about 16-17% according to Tourky *et al.*, (1995). The following characteristics were determined: average bunch weight (g), bunch width and length (cm) and number of berries per bunch.

3. Physical characteristics of berries :

Berry weight (g), berry size (cm^3) and berry dimensions (length and diameter) (cm).

4. Chemical characteristics of berries :

Total soluble solids in berry juice (T.S.S.) (%) was determined by a hand refractometer and total titratable acidity as tartaric acid (%) (A.O.A.C. 1985).

5-Vegetative growth and wood ripening

At growth cessation, the following morphological and chemical determinations were carried out on 4 shoots / the considered vine:

1- Average shoot length (cm).

2- Average number of leaves/shoot.

3- Average leaf area (cm^2) of the apical 5^{th} and 6^{th} leaves using a planimeter.

4-Coefficient of wood ripening was calculated by dividing length of the ripened part by the total length of the shoot according to Bouard (1966).

6. Leaf content of pigments:

Leaf content of pigments (chlorophyll A, B and carotene) (mg/g fresh weight) of the 5^{th} and the 6^{th} leaves of the shoot (Westein, 1957).

7- Statistical analysis:

The complete randomized block design was adopted for the experiment. The statistical analysis of the present data was carried out according to Snedecor and Chocran (1972). Averages were compared using the new L.S.D. values at 5% level. Percentages were transformed by the equation prior to the statistical analysis and thereafter percentages were presented with statistical letters.

RESULTS AND DISCUSSION

1. Bud behaviour

***Dynamics of bud burst:-**

Data illustrated in Figure (1) show that all Dormex concentrations hastened the beginning of bud burst and reached to 50% bud break than the untreated vines. No differences were noticed between 3% and 5% of Dormex concentrations with regard to 50% bud break. Concerning the effect of Dormex application date, early Dormex application (December 15^{th} or December 22^{th}) advanced both first and 50 % bud break as compared with the other dates, however, Dormex application on December 15^{th} or December 22^{th} gave an earliness in the beginning of bud burst by about one week than the medium Dormex applications (December 29^{th} or January 5^{th}); two weeks than the late Dormex applications on (January 12^{th} or January 19^{th}) and three weeks compared with the control in both seasons. Conclusively, control vines (0.0 Dormex) were the last to commence bud break, the earliest bud break was shown by the earliest Dormex application date and the high Dormex concentration.

Earliness of bud burst with Dormex (hydrogen cyanamide H_2CN_2) applications may be due to its role in increasing rate of respiration, measured as CO_2 evaluation and by reducing catalase activity as mentioned by Schulman *et al.*, (1983), similar effects were reported by Hurter *et al.*, (1991); Nir and Lavee (1993); Sorial *et al.*, (1993, a); Cartabelota *et al.*, (1994); El-Shazly, (1999) and El-Mogy *et al.*, (2002) they found that spraying grapevines with Dormex markedly accelerated bud break and eliminated its irregularities to a large extent.

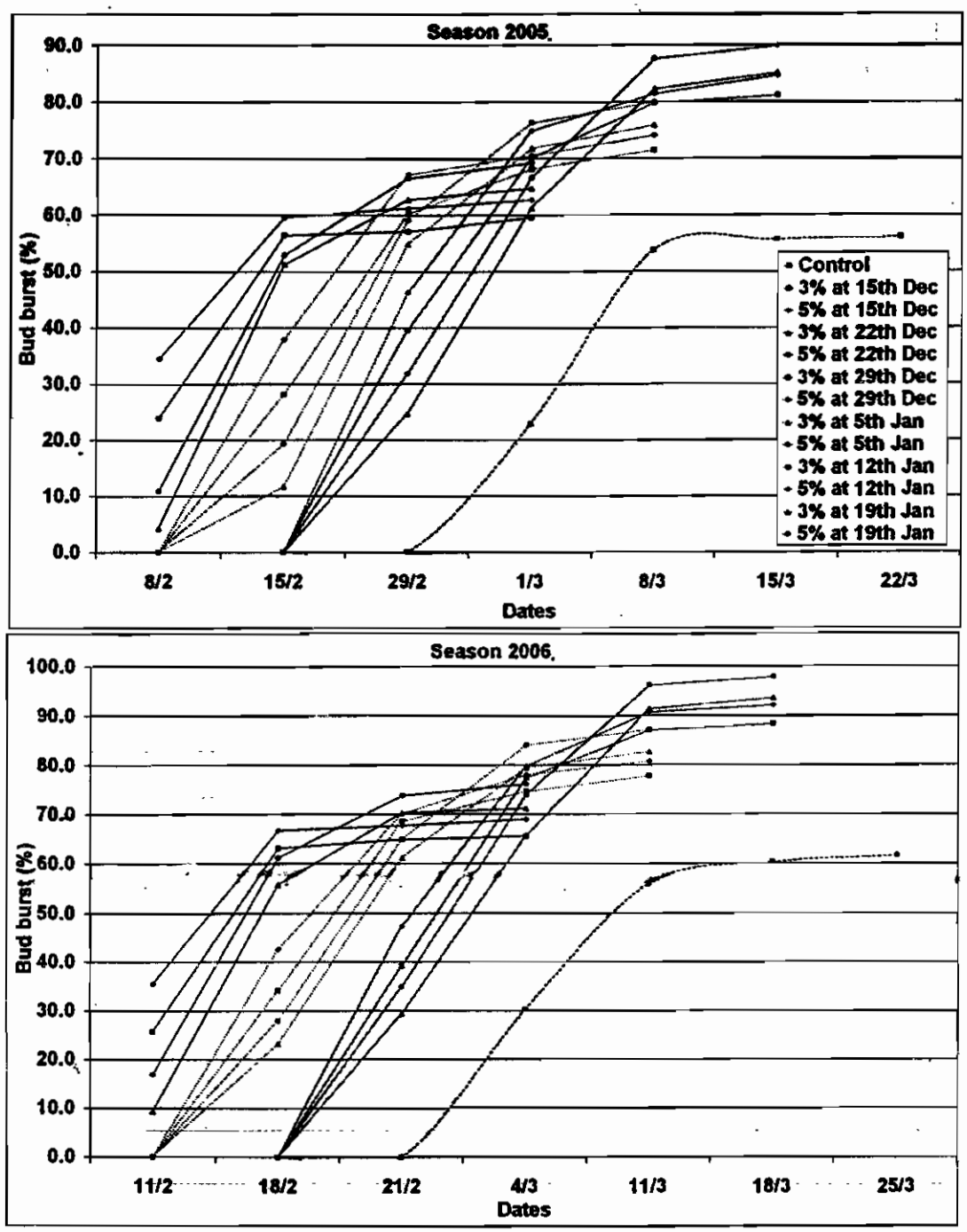

Fig (1): Average weekly bud burst (%) as affected by different treatments.

•Bud burst percentage:-

Regarding the effect of Dormex spray on bud burst percentages, data of both seasons in Table (1), indicated that increasing the applied Dormex concentrations significantly increased the percentages of bud burst. The most remarkable increment was obtained by the last tested application date (January 19) with the highest tested Dormex concentration (5%). The preference of late Dormex application in promoting bud burst percentage in comparison with early application date might be attributed to coincidence of deep (winter) dormancy of the buds at time of early application as suggested by Smit and Burnett (1986).

•Coefficient of bud fertility-:

The effect of treatments in this respect was found to go parallel with bud burst (%) which was appreciably increased as a result of the increase of bud burst (%).

These results agree with those found by Miele (1991); Sabry (1994); Tourky *et al.*, (1995); Nashaat (1996); Abd El-All (1996); El Sabrout (1998); El-Shazly, (1999) and El-Mogy *et al.*, (2002). They found that Dormex spray increased bud burst and bud fertility in many grape cultivars.

2. Yield and physical characteristics of bunches

Data of both seasons (Table 2) showed a significant increase in average number of bunches, yield per vine and average bunch weight with Dormex treatments as compared to control. It was found that Dormex application increased average number of bunches per vine (as a result of the increase in bud fertility).

With regard to the effect of Dormex application date, it is clear that the yield increments were more pronounced with the late application date than the other application dates. In both seasons, late application (January 12th or January 19th) gave the highest number of bunches and yield followed in a descending order by medium application dates (December 29th or January 5th) and early applications (December 15th or December 22th). On the other hand, bunch weight showed a trend reverse to that of the number of bunches.

The effect of Dormex applications on bunch dimensions i.e. length and width was statistically insignificant.

From the previously mentioned results, it can be concluded that the effect of Dormex on increasing the yield per vine was gained as a result of its effect on increasing both number of bunches/vine and average bunch weight through increasing both bud burst (%) and bud fertility coefficient. The results in this connection are in agreement with those obtained by Miele (1991); Ayaad (1992); EL-Shahat (1992); Sorial *et al.*, (1993, b); EL-Sayed (1994); Sabry (1994); Abd El-All (1996); Nashaat (1996); Tourky *et al.*, (1996); El-Sabrout (1998); El-Shazly, (1999) and El-Mogy *et al.*, (2002). They stated that Dormex application caused an obvious increase in the yield and improvement of bunch physical characteristics of some grape cultivars.

Table (1) : Effect of Dormex concentrations and application dates on bud behaviour of Superior grapevines

		Bud burst (%)		Coefficient of bud fertility	
		2005	2006	2005	2006
(A) : Application date	(A1) December 15th	59.5	65.4	0.26	0.27
	(A2) December 22th	63.3	69.7	0.26	0.28
	(A3) December 29th	67.2	73.4	0.27	0.29
	(A4) January 5th	70.7	77.2	0.28	0.30
	(A5) January 12th	73.9	80.8	0.28	0.30
	(A6) January 19th	77.0	84.4	0.29	0.31
new L.S.D. (A) =		4.7	5.1	0.02	0.02
(B) : Concentration	(B1) 0 % (control)	56.1	61.7	0.25	0.26
	(B2) 3 %	73.0	79.9	0.28	0.30
	(B3) 5 %	78.7	83.9	0.29	0.31
new L.S.D. (B) =		3.3	3.6	0.01	0.01
(AXB) : Interaction	A1 B1	56.1	61.7	0.25	0.26
	B2	59.6	65.5	0.26	0.27
	B3	82.7	89.0	0.27	0.28
	A2 B1	56.1	61.7	0.25	0.26
	B2	64.7	71.2	0.27	0.29
	B3	69.2	76.1	0.27	0.29
	A3 B1	56.1	61.7	0.25	0.26
	B2	71.4	77.8	0.28	0.30
	B3	74.1	80.8	0.28	0.30
	A4 B1	56.1	61.7	0.25	0.26
	B2	75.9	82.7	0.29	0.31
	B3	80.0	87.2	0.29	0.32
	A5 B1	56.1	61.7	0.25	0.26
	B2	81.1	88.4	0.29	0.32
	B3	64.6	92.2	0.30	0.33
	A6 B1	56.1	61.7	0.25	0.26
	B2	85.1	93.6	0.30	0.33
	B3	89.8	97.9	0.31	0.34
new L.S.D. (AXB) =		8.1	8.9	0.03	0.03

Table (2) : Effect of Dormex concentrations and application dates on the yield/vine and some bunch physical characteristics of Superior grapevines

		No. of bunches		Yield (kg)		Bunch weight (g)		Bunch length (cm)		Bunch width (cm)	
		2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
(A) : Application date	(A1) December 15th	18.7	19.4	8.98	9.90	479.2	508.7	20.10	20.17	12.73	12.50
	(A2) December 22th	19.0	20.2	9.03	10.18	475.5	504.5	20.07	20.13	12.67	12.43
	(A3) December 29th	19.4	20.6	9.16	10.34	470.5	500.3	20.03	20.10	12.63	12.40
	(A4) January 5th	19.9	21.4	9.31	10.61	466.8	496.1	19.97	20.03	12.57	12.37
	(A5) January 12th	20.2	21.8	9.35	10.76	463.4	491.9	19.93	20.03	12.53	12.30
	(A6) January 19th	20.6	22.3	9.48	10.92	458.9	488.8	19.90	20.00	12.50	12.27
new L.S.D. (A) =		1.1	1.3	0.34	0.43	11.3	9.5	N.S	N.S	N.S	N.S
(B) : Concentration	(B1) 0 % (control)	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	(B2) 3 %	20.3	21.8	9.62	10.98	474.9	503.6	20.07	20.15	12.68	12.43
	(B3) 6 %	20.6	22.3	9.86	11.30	478.3	506.8	20.13	20.18	12.73	12.50
new L.S.D. (B) =		0.8	0.9	0.24	0.30	8.0	6.7	N.S	N.S	N.S	N.S
(AXB) : Interaction	A1 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	18.7	19.4	9.18	10.09	490.2	519.1	20.20	20.30	12.90	12.60
	B3	19.4	20.2	9.59	10.53	493.3	522.3	20.30	20.30	12.90	12.70
	A2 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	19.4	20.9	9.41	10.71	484.1	512.8	20.20	20.20	12.80	12.50
	B3	19.4	20.9	9.50	10.77	488.7	515.9	20.20	20.30	12.80	12.80
	A3 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	20.2	21.6	9.61	10.94	476.5	506.5	20.10	20.20	12.70	12.50
	B3	20.2	21.6	9.70	11.01	481.0	509.6	20.20	20.20	12.80	12.50
	A4 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	20.9	22.3	9.85	11.16	471.7	500.2	20.00	20.10	12.60	12.40
	B3	20.9	23.0	9.92	11.60	474.9	503.3	20.10	20.10	12.70	12.50
	A5 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	20.9	23.0	9.76	11.38	467.4	494.0	20.00	20.10	12.60	12.30
	B3	21.6	23.8	10.13	11.81	468.8	497.1	20.00	20.10	12.60	12.40
	A6 B1	18.0	18.7	8.17	9.07	453.9	484.7	19.80	19.90	12.40	12.20
	B2	21.8	23.8	9.93	11.63	459.8	489.3	19.90	20.00	12.50	12.30
	B3	22.3	24.5	10.33	12.05	462.8	492.4	20.00	20.10	12.60	12.30
new L.S.D. (AXB) =		2.0	2.3	0.59	0.75	19.6	16.5	N.S	N.S	N.S	N.S

Now it is clear that, if early bud burst and consequently early harvesting is the aim of the grower, it is necessary to use early and medium application dates of Dormex. On the other hand, increasing the yield through increasing bud burst and fertility coefficient and consequently increasing number of bunches and yield could be achieved through medium and late Dormex application dates using a relatively high Dormex concentration (5%).

3. Physical characteristics of berries:

Positive effects attributed to Dormex applications were evident on berry weight, size, length and diameter except for the berry shape index which was insignificantly affected (Table, 3). Dormex at 5% or 3% significantly increased these parameters as compared with the control.

As for the application dates, it was found that early Dormex application (December 15th or December 22th) was more pronounced in increasing all studied physical characteristics of grapes than the other dates in both seasons. Similar notations were mentioned by Sabry (1994); Abd El-All (1996) and El-Sabrout (1998), who pointed out that spraying grapevines with Dormex improved berry physical characteristics.

The increment in bunch and berry weight with Dormex treatments might be ascribed to the parallel increment observed in the leaf area the result of which photosynthesis activity of the leaves was increased.

4. Chemical characteristics of berries:

It is evident from the data in (Table, 4) that, increasing Dormex concentrations markedly increased juice TSS and TSS/acid ratio and reduced acidity as compared with the control. The increment was more pronounced with Dormex at 3% or 5%.

Concerning the effect of spraying date, it can be noticed that early Dormex application (December 15th or December 22th) significantly increased both TSS and TSS/acid ratio and reduced acidity as compared with the other dates. These results might be attributed to the advance of bud break and consequently all subsequent stages of the annual growth cycle. An earliness in bunch ripening was observed during the course of this investigation, where early Dormex application advanced berry ripening by about 7-14 days as compared with the other application dates.

The results in this respect are in harmony with those obtained by Sorial *et al.*, (1993, b); Lotfy (1993); Sabry (1994); Abd El-All (1996); Tourky *et al.*, (1996); Nashaat (1996); El-Shazly, (1999) and El-Mogy *et al.*, (2002) working on different grape cultivars. They reported that Dormex spray improved fruit quality.

5-Vegetative growth and wood ripening

The data concerning vegetative growth (Table 5) indicated that Dormex spray had a significant effect on vine's vigor parameters; shoot length, number of leaves, leaf area and coefficient of wood ripening as well. Dormex at 3 or 5 % significantly increased these parameters as compared with the control. No significant differences were found between 3 and 5 % Dormex in both seasons. The present results also revealed that vines sprayed with the different studied Dormex concentrations on either December, 15 or 22 significantly increased these parameters as compared with those sprayed on January, 12 or 19 and this was true for both experimental seasons.

Table (3) : Effect of Dormex concentrations and application dates on some berry physical characteristics of Superior grapevines

		Berry weight (g)		Berry size (cm3)		Berry length (cm)		Berry diameter (cm)		Berry shape index	
		2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
(A) : Application date	(A1) December 15th	3.11	3.17	2.88	2.94	2.14	2.16	1.75	1.77	1.22	1.22
	(A2) December 22th	3.10	3.15	2.87	2.92	2.14	2.15	1.75	1.76	1.22	1.22
	(A3) December 29th	3.08	3.14	2.85	2.91	2.13	2.15	1.74	1.76	1.22	1.22
	(A4) January 5th	3.07	3.13	2.84	2.89	2.13	2.15	1.74	1.76	1.22	1.22
	(A5) January 12th	3.05	3.11	2.82	2.88	2.12	2.14	1.73	1.75	1.23	1.22
	(A6) January 19th	3.04	3.11	2.81	2.87	2.12	2.14	1.73	1.75	1.23	1.22
new L.S.D. (A) =		0.04	0.03	0.05	0.04	0.02	0.02	0.02	0.02	N.S	N.S
(B) : Concentration	(B1) 0 % (control)	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	(B2) 3 %	3.10	3.15	2.87	2.92	2.14	2.16	1.75	1.77	1.22	1.22
	(B3) 5 %	3.11	3.16	2.88	2.93	2.14	2.16	1.75	1.77	1.22	1.22
new L.S.D. (B) =		0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.01	N.S	N.S
(AXB) : Interaction	A1 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.15	3.20	2.92	2.97	2.15	2.17	1.76	1.78	1.22	1.22
	B3	3.16	3.21	2.94	2.99	2.16	2.17	1.77	1.78	1.22	1.22
	A2 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.13	3.18	2.90	2.95	2.15	2.16	1.76	1.77	1.22	1.22
	B3	3.15	3.19	2.92	2.96	2.15	2.17	1.76	1.78	1.22	1.22
	A3 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.10	3.16	2.88	2.94	2.14	2.16	1.75	1.77	1.22	1.22
	B3	3.12	3.17	2.89	2.94	2.14	2.16	1.75	1.77	1.22	1.22
	A4 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.09	3.14	2.85	2.90	2.13	2.15	1.74	1.76	1.22	1.22
	B3	3.10	3.15	2.87	2.92	2.14	2.16	1.75	1.77	1.22	1.22
	A5 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.06	3.12	2.83	2.89	2.13	2.15	1.74	1.76	1.22	1.22
	B3	3.08	3.13	2.84	2.89	2.13	2.15	1.74	1.76	1.22	1.22
	A6 B1	3.02	3.09	2.79	2.86	2.11	2.13	1.72	1.74	1.23	1.22
	B2	3.05	3.11	2.82	2.88	2.12	2.14	1.73	1.75	1.23	1.22
	B3	3.06	3.12	2.82	2.88	2.13	2.15	1.74	1.76	1.22	1.22
new L.S.D. (AXB) =		0.07	0.06	0.08	0.07	0.03	0.03	0.03	0.03	N.S	N.S

Table (4) : Effect of Dormex concentrations and application dates on some berry chemical characteristics of Superior grapevines

		TSS (%)		Acidity (%)		TSS/acid ratio	
		2006	2006	2005	2006	2006	2006
(A) : Application date	(A1) December 15th	17.4	17.2	0.83	0.81	21.1	21.5
	(A2) December 22th	17.1	16.9	0.84	0.81	20.5	20.9
	(A3) December 29th	16.6	16.7	0.85	0.83	19.8	20.1
	(A4) January 5th	16.6	16.4	0.86	0.84	19.3	19.8
	(A5) January 12th	16.4	16.2	0.88	0.85	18.7	19.0
	(A6) January 19th	16.3	16.2	0.89	0.86	18.3	18.8
new L.S.D. (A) =		0.7	0.6	0.03	0.05	1.6	1.4
(B) : Concentration	(B1) 0 % (control)	16.1	16.0	0.90	0.87	17.9	18.4
	(B2) 3 %	17.0	16.8	0.84	0.82	20.2	20.5
	(B3) 5 %	17.2	17.0	0.83	0.81	20.7	21.0
new L.S.D. (B) =		0.5	0.4	0.02	0.03	1.1	1.0
(AXB) : Interaction	A1 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	17.9	17.7	0.80	0.78	22.4	22.7
	B3	18.2	18.0	0.79	0.77	23.0	23.4
	A2 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	17.5	17.2	0.81	0.79	21.6	21.8
	B3	17.8	17.8	0.81	0.78	21.9	22.4
	A3 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	17.1	16.9	0.83	0.81	20.5	20.8
	B3	17.3	17.1	0.82	0.80	21.0	21.3
	A4 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	16.8	16.6	0.85	0.83	19.8	20.0
	B3	17.0	16.7	0.84	0.82	20.3	20.4
	A5 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	16.5	16.2	0.87	0.85	18.9	19.0
	B3	16.8	16.4	0.86	0.84	19.3	19.6
	A6 B1	16.1	16.0	0.90	0.87	17.9	18.4
	B2	16.3	16.2	0.89	0.86	18.3	18.8
	B3	16.4	16.3	0.88	0.85	18.7	19.2
new L.S.D. (AXB) =		1.2	1.0	0.06	0.08	2.8	2.4

Table (5) : Effect Dormex concentration and application dates on some vegetative growth characteristics and wood ripening of Superior grapevines

		Shoot length (cm)		No. of leaves per shoot		Leaf area (cm2)		Coe. of wood ripening	
		2005	2006	2005	2006	2006	2006	2005	2006
(A) : Application date	(A1) December 15th	184.3	195.7	31.1	33.2	160.6	167.4	0.80	0.85
	(A2) December 22th	182.9	194.0	30.9	33.0	159.2	165.7	0.79	0.84
	(A3) December 29th	180.9	192.4	30.5	32.7	157.2	164.1	0.78	0.83
	(A4) January 5th	179.8	190.8	30.3	32.4	155.9	162.5	0.78	0.83
	(A5) January 12th	178.2	189.2	30.1	32.2	154.5	160.9	0.77	0.82
	(A6) January 19th	176.5	188.0	29.8	31.9	152.8	159.7	0.76	0.81
new L.S.D. (A) =		3.9	3.4	0.7	0.6	4.3	3.6	0.02	0.02
(B) : Concentration	(B1) 0 % (control)	174.6	186.4	29.5	31.7	150.9	158.1	0.76	0.81
	(B2) 3 %	182.7	193.7	30.8	32.9	159.0	165.4	0.79	0.84
	(B3) 5 %	183.9	194.9	31.1	33.1	160.2	166.8	0.80	0.84
new L.S.D. (B) =		2.7	2.4	0.5	0.4	3.0	2.6	0.01	0.01
(AXB) : Interaction	A1 B1	174.6	186.4	29.5	31.7	160.9	158.1	0.76	0.81
	B2	188.5	199.7	31.8	33.9	164.8	171.4	0.82	0.86
	B3	189.7	200.9	32.0	34.1	166.0	172.8	0.82	0.87
	A2 B1	174.6	186.4	29.5	31.7	150.9	158.1	0.78	0.81
	B2	186.2	197.2	31.4	33.5	162.5	168.9	0.81	0.85
	B3	187.9	198.4	31.7	33.7	164.2	170.1	0.81	0.86
	A3 B1	174.6	186.4	29.5	31.7	150.9	158.1	0.76	0.81
	B2	183.3	194.8	30.9	33.1	159.6	166.5	0.79	0.84
	B3	185.0	196.0	31.2	33.3	161.3	167.7	0.80	0.85
	A4 B1	174.6	186.4	29.5	31.7	150.9	158.1	0.76	0.81
	B2	181.4	192.4	30.6	32.7	157.7	164.1	0.79	0.83
	B3	182.7	193.6	30.8	32.9	159.0	165.3	0.79	0.84
	A5 B1	174.6	186.4	29.5	31.7	150.9	158.1	0.76	0.81
	B2	179.8	190.0	30.3	32.3	156.1	161.7	0.78	0.82
	B3	180.3	191.2	30.4	32.5	156.6	162.9	0.78	0.83
	A6 B1	174.6	186.4	29.5	31.7	150.9	158.1	0.76	0.81
	B2	176.9	188.2	29.9	32.0	153.2	159.9	0.77	0.82
	B3	178.0	189.4	30.1	32.2	154.3	161.1	0.77	0.82
new L.S.D. (AXB) =		6.7	5.9	1.2	1.1	7.5	6.3	0.03	0.03

Increments in leaf area with Dormex applications would be expected since the pathway of Dormex degradation in the plant is urea substrate. Generally, the results concerning the effect of Dormex spray on vegetative growth were in coincidence with those of bud burst percentage, where, increasing bud burst percentage dramatically decreased the vegetative growth of vines.

The above mentioned results are in accordance with those reported, by Hurter *et al.*, (1991); Tourky *et al.*, (1995) and El-Sabrout (1998) and El-Mogy *et al.*, (2002) who working on some grape cultivars, pointed out that Dormex spray increased the vegetative growth of the vines.

6. Leaf content of pigments:

The positive effects attributed to Dormex spray were evident on chlorophyll (A) except for the chlorophyll (B) and carotene which were insignificantly affected (Table, 6). Dormex at 5% or 3% significantly increased chlorophyll (A) as compared with the control.

Regarding the application dates it was found that early Dormex application (December 15th or December 22th) were found to increase remarkably chlorophyll (A) of leaves in comparison with the other dates in both seasons of this investigation.

Similar results were obtained by Abd El-All (1996) who pointed out that spraying grapevines with Dormex increased the leaf content of pigments.

Data illustrated in Figure (2 and 3) clearly showed that there was a highly positive correlation between the leaf area and the average berry weight with degree (1.00 & 1.00) and between the leaf area and the coefficient of wood ripening with degree (1.00 &1.00) in both seasons respectively.

Figure (4 and 5) revealed also the existence of a highly positive correlation between leaf area and total soluble solids of berry juice with degree (0.99 & 0.99) and a highly negative correlation between leaf area and total acidity of berry juice with degree (- 1.00 & -1.00) in both seasons respectively.

It is clear from the foregoing results that the problem of insufficient chilling requirements for Superior grapevines in Egypt can be successfully solved. Accordingly if the grower aims to obtain early and highly paid yields without a big risk, he has to apply Dormex at 3 or 5 %during late December or early January (December 29th or January 5th). Such medium Dormex application dates would terminate winter dormancy and result in earlier and more uniform bud burst, earlier fruit setting and earlier fruit ripening.

Nevertheless, the grower must take into consideration that any exaggeration in advancing Dormex application date (December 15th or December 22th) may cause too early bud burst in a very cool weather with low light intensity. This might cause frost injury and abscission of all or some flower bunches and yielding irregular and low percentage of bud break and consequently the yield is very low (Smit and Burnett, 1986).

However, late Dormex application date (January 12th or January 19th) could be used with Superior grapevines for objectives other than advancing harvest. Thus, the late Dormex application date at high concentrations greatly enhanced percentage of bud burst and coefficient of bud fertility. Consequently, number of bunches and yield per vine were obviously increased.

Table (6) : Effect of Dormex concentrations and application dates on leaf content of pigments of Superior grapevines

		Chlorophyll (A) (mg/g F.W.)		Chlorophyll (B) (mg/g F.W.)		Carotene (mg/g F.W.)	
		2005	2006	2005	2006	2005	2006
(A) : Application date	(A1) December 15th	0.71	0.76	0.23	0.20	0.20	0.16
	(A2) December 22th	0.70	0.75	0.23	0.20	0.20	0.16
	(A3) December 29th	0.69	0.74	0.22	0.19	0.19	0.17
	(A4) January 5th	0.67	0.73	0.22	0.19	0.19	0.17
	(A5) January 12th	0.65	0.71	0.22	0.16	0.19	0.16
	(A6) January 19th	0.65	0.70	0.22	0.18	0.19	0.16
new L.S.D. (A) =		0.03	0.05	N.S	N.S	N.S	N.S
(B) : Concentration	(B1) 0 % (control)	0.63	0.69	0.21	0.17	0.18	0.15
	(B2) 3 %	0.70	0.75	0.23	0.20	0.20	0.18
	(B3) 5 %	0.71	0.76	0.23	0.20	0.20	0.16
new L.S.D. (B) =		0.02	0.03	N.S	N.S	N.S	N.S
(AXB) : Interaction	A1 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.75	0.79	0.24	0.21	0.21	0.19
	B3	0.76	0.80	0.24	0.22	0.21	0.20
	A2 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.74	0.76	0.24	0.21	0.21	0.19
	B3	0.74	0.79	0.24	0.21	0.21	0.19
	A3 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.71	0.76	0.23	0.20	0.20	0.18
	B3	0.72	0.77	0.23	0.21	0.20	0.19
	A4 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.69	0.74	0.23	0.19	0.20	0.17
	B3	0.69	0.75	0.23	0.20	0.20	0.18
	A5 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.66	0.72	0.22	0.19	0.19	0.17
	B3	0.67	0.72	0.23	0.19	0.20	0.17
	A6 B1	0.63	0.69	0.21	0.17	0.18	0.15
	B2	0.65	0.70	0.22	0.18	0.19	0.16
	B3	0.66	0.71	0.22	0.18	0.19	0.16
new L.S.D. (AXB) =		0.06	0.08	N.S	N.S	N.S	N.S

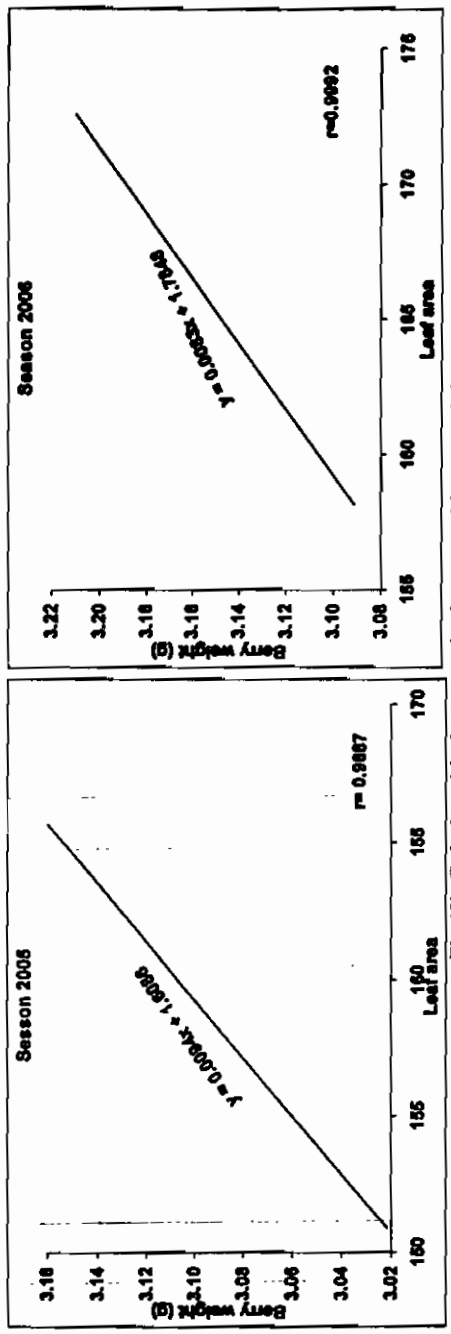

Fig (2): Relationship between leaf area and berry weight

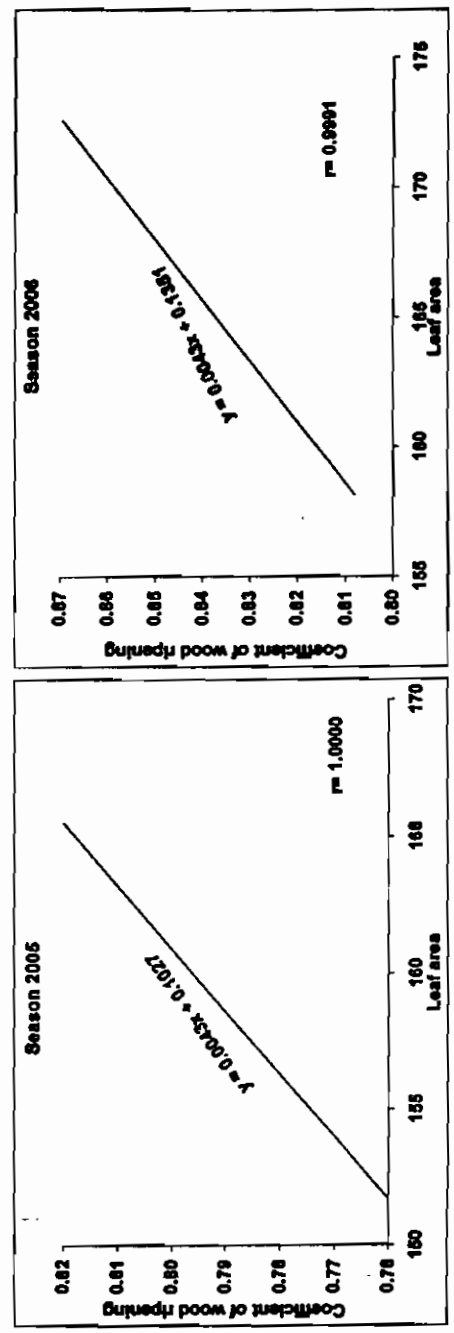

Fig (3): Relationship between leaf area and coefficient of wood ripening

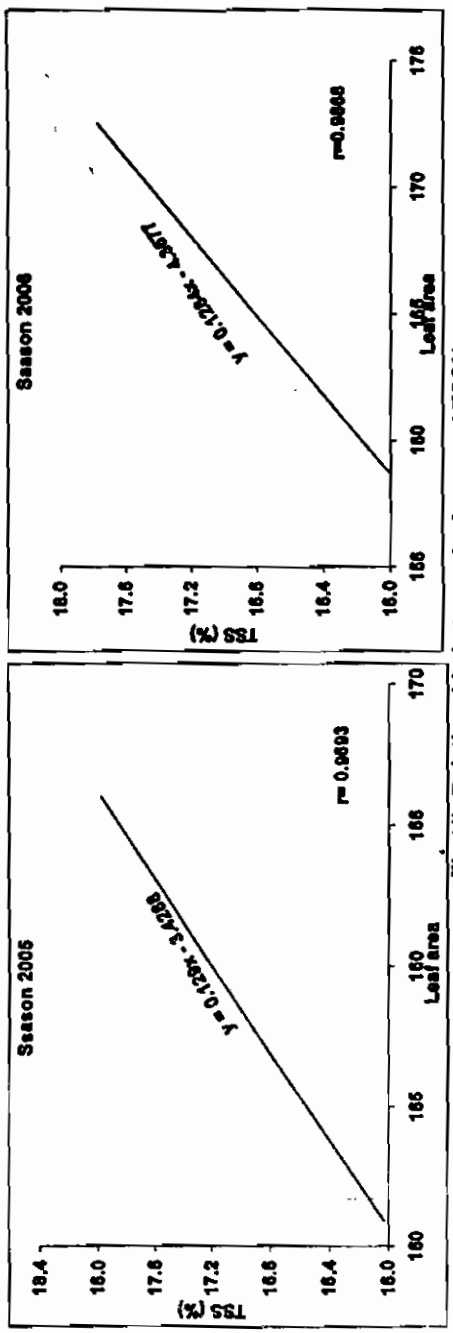

Fig (4): Relationship between leaf area and TSS%

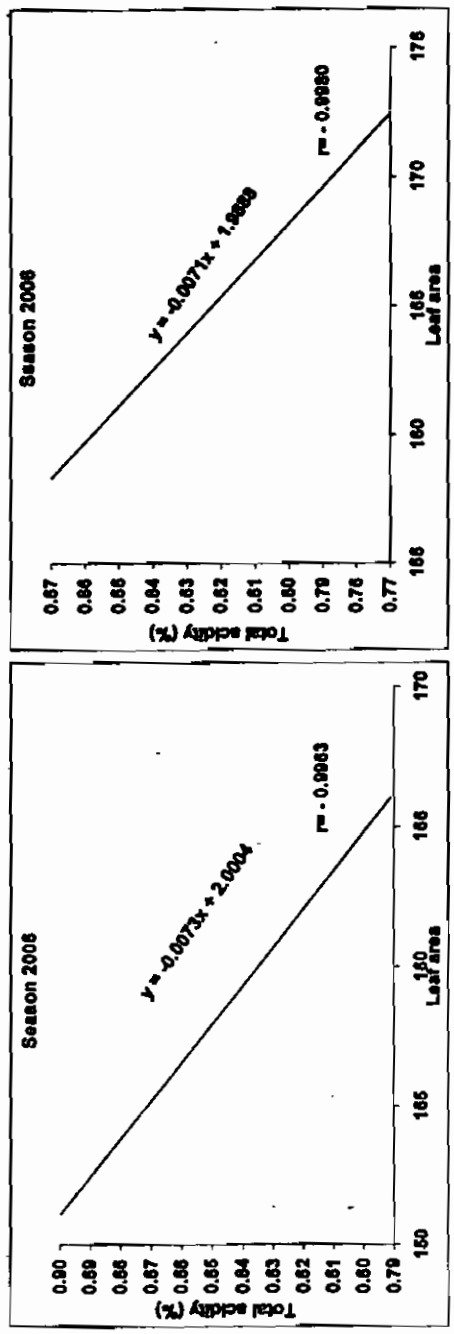

Fig (5): Relationship between leaf area and total acidity%

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تأثير تركيز وموعد إضافة سينامين الهيدروجين (الدورمكس) على سلوك العيون والنمو والإنتاجية لكرمات العنب السوبيريور

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أجرى هذا البحث لدراسة تأثير رش الدورمكس بتركيزات مختلفة وفى مواعيد مختلفة على سلوك العيون والنمو والإنتاجية لكرمات عنب السوبيريور. حيث تم رش الدورمكس بتركيزات (صفر، ٣ ، ٥%) فى ستة مواعيد مختلفة يفصل بين الموعد والأخر الذى يليه أسبوع كفترة زمنية ثابتة وهى ١٥ ديسمبر، ٢٢ ديسمبر، ٢٩ ديسمبر، ٥ يناير، ١٢ يناير، ١٩ يناير.

وقد أشارت نتائج الدراسة إلى أن رش الدورمكس بتركيز ٥% قد أعطى أفضل النتائج فعند إضافته مبكرا فى (١٥ ديسمبر أو ٢٢ ديسمبر) أعطى تبكيرا ملحوظا لموعد تفتح البراعم مع عدم إنتظام التفتح وإنخفاض نسبة التفتح مما ترتب عليه إنخفاض فى المحصول، بينما عند رش الدورمكس متأخرا فى (١٢ يناير أو ١٩ يناير) فقد أعطى أفضل نسبة لتفتح البراعم مع زيادة نسبة البراعم المثمرة.

يعد رش الدورمكس فى أواخر ديسمبر وأوائل يناير (٢٩ ديسمبر أو ٥ يناير) هى الفترة التى يمكن التوصية بها فقد حققت أفضل تبكير فى تفتح البراعم مع إنتظام التفتح وإرتفاع نسبته ، بالاضافة إلى تحقيق نمو خضرى مناسب مع محصول جيد ذو مواصفات جودة عالية .