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HEAT REQUIREMENTS OF CRIMSON SEEDLESS GRAPEVINES AND ITS RELATIONSHIP WITH FRUTING AND GROWTH AT TWO DIFFERENT REGIONS IN A.R.E.

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ABSTRACT

This research amied to study heat requirement of Crimson Seedless grapevines and its relationship with growth and yield properties during 2009 and 2010 seasons in two different regions, the first at El-Santa Gharbia in clay soil at Middle Nile Delta and the other in El-Nobaria Behyra, new reclamation land. Planting distance was 1.5 X 3.0 m between the vines and the rows, the vines supported by Gable trellis system with vine load was 120 buds/vine. Number of cluster was adjusted to 28 clusters per vine. The resulted from this study showed that, grapevine grown under El-Santa Gharbia delayed budburst, full bloom, and harvest date than those grown under El-Nobaria Behyra condition. The data also reveal that, leaf area, shoot length, pruning weight, berry coloration and soluble solid content was higher under Gharbia region. Since, from the available data were recommended to planting Crimson Seedless grape under Delta region than under desert condition in order to obtained clusters with good quality and increased the income (L.E) for the Farmers.

INTRODUCTION

Grapevine has a fairly predictable cycle of growth. The grapevines growth can be described by its phonological events. Understanding the phonology of a given plant system is important in determining the ability of a region to produce a crop within the confines of its climatic region Combe (1988). From a husbandly viewpoint, knowledge of plants growth stages is advantageous as cultural and chemical practices can be applied at optimum times in a plants annual growth cycle. Additionally, information regarding growth stages can be useful in estimating crop yield. This study was carried out the determination of the relationship between heat requirements and phonological stages of Crimson Seedless grapevines in two different regions which was differ climatic. The first in the Nile Delta region of clay soil (El-Santa center at Gharbia Governorate), while the second region was (Nobaria Behyra Governorate) of a sand soil a new land reclamation. In the past years of viticultural research have brought more progress in production than the prior century. Advances in both basic and applied research have led to a broader and more nearly correct understanding of vine responses to the environment and cultural practices.

MATERIALS AND METHODS

The present work has been carried out during the two successive seasons of 2009 and 2010 to determine the heat requirements in relation to different phonological stages of Crimson Seedless vine cultivar grown in a commercial private vineyard in two regions in A. R. E.

First region under the environmental condition of El-Santa at Gharbia Governorate (Middle delta) and the second region located at the side of Alexandria Cairo desert road, 92 Km far from Alexandria under the environmental conditions of El-Nobaria (El-Behera) Governorate (North West of the Nile Delta)

The investigated vine cultivar in the two regions were seven years old at the beginning of investigation, the planting distance was 1.5 X 3.0 meter between the vines and the rows. The trellising was Gable – shape system.. The chosen vines in each cultivar were healthy in growth and vines of each cultivar were nearly similar in vigor. Vines were cane trained, cane pruned at third week of February in the two regions in both studied seasons, with 10 canes per a vine and 12 buds per a cane i.e., 120 eyes per vine (bud load)

The vines of the first region grown in a clay soil under surface irrigation system and the vines of the second region grown in a sandy soil and irrigated under drip irrigation system (soil and water analysis in table (1 and 2)). The two experimental designs were randomized complete blocks with three replicates, each 40 vines and each region was represented by 120 vines. The vines of two regions received nearly the same agricultural practices especially N fertilizers (30 unite/ Fe.). The vines of each region were used to study:

1- Date of phonological stages.

A- **Sapmovement date:** Sapmovement date was recorded when the liquid flows from the xylem if the cane is cut.

B- **Budburst date :** Budburst date was recorded when 50 % of buds on the vines reached this stage the date of budburst was recorded according to Huglin (1956) and Pouget (1963).

C- Beginning of flowering: Bloom is the period when the caps (Calyptras) fall from the flowers.

D- Full bloom: Full bloom that time when an average of 50 percentage of the calyptras have fallen from the flowers.

E- Beginning of ripening: the time that berries begin to color and soften, berry size increases rapidly and the mount of sugars remains low and constant and the acidity is high (Veraison).

F- Harvesting date:

Yield was harvested when SSC % of berry juice reached 17-18 % according to Turkey *et al.* (1995).

These parameters were recorded according to Gergory and Robert (2000).

2- Number of days for each phonological stage was calculated.

3- Berry set percentage: Was estimated according to Gergory and Robert (2000).

4- Vegetative growth of the vines:

- was evaluated in terms of average leaf area (cm^2) in the mature leaves at 5-7th position from the shoot tip (of fruit full shoot) at Veraison by using leaf area meter mode by cid, Inc, Vancouver, USA then vine area (m^2) calculated. Average shoot length (cm), (20 vegetative shoot per replicate were labeled during growth season) and at the end of growing season was measured.

- Weight of pruning wood: Were recorded as (kg)/vine by using all shoots age 1-year at winter pruning as a parameter of vegetative growth.

- Coefficient of wood ripening:

At the end of growth wood ripening was calculated by dividing the length of the ripened part of the shoot (brownish part) by the total length of the shoot according to Bourd (1966).

- Cane content of total carbohydrates %: three vegetative canes/ vine were labeled during growth season and collected at winter pruning to determining total carbohydrates (g/100g dry weight) according to Smith *et al.* (1956).

5- Physical and chemical characteristics of berries:

At harvest time the following parameters were taken to evaluate total yield / vine in kg for the tested regions by multiplying number of bunches per vine by weight of bunch in kg, bunch length (cm), and number of berries per bunch were calculated. Soluble solids percentage in berry juice (SSC %) were determined by using a hand refractometer, total titrable acidity (as tartaric acid %)
according to A.O.A.C (1985) and total Anthocyanin in berry skin (mg/100g fresh weight) according to Husia *et al.* (1965).

- The gradual changes of SSC % in berry juice according to coloration in berries skin were estimated as coloration at: (Veraison, 25%, 50%, 75% and at full coloration) by collecting five random samples each of 100 berries/ replicate at seven days intervals beginning from Veraison tell full colored berries. Then percentage of SSC % was recorded for each sample according to Omar and Girgis (2005).

6 - Heat summation:

During the two studies seasons the weather was recorded according to the meteorological data in (kotor Gharbia and El-Delengat Behyra stations) ,regions to estimate heat summation as degree days for the period from Sapmovement to harvesting for each region by determining the sum of the mean daily temperature above (10^o C) for each phonological phase concern the sum of average temperatures (SAT = $(T_{maximum} + T_{minimum})/2-10$) while there are numerous accumulated heat indices used to evaluate grapevine parameters (growing degree – days base 10^o C is most common, see for good review), according to Winkler (1965).

7 - Income of unite area (Fe.):

At the end of studied seasons income as average of unite area (L.E/Fe) were calculated for each region.

- The obtained data were tabulated and statistically analyzed according to Snedecor and Cochran (1990) using the new L.S.D. test for comparing the differences between various means.

RESULTS AND DISCUSSION

Water quality is one of the more important factors involved in grape production, its importance in general has been over emphasized nearly as often as it has been of neglected. The grow in moist soil, and for the most part they take up irrigation. Data in table (1) show that water irrigation in two regions under study contains moderate concentration from element, and the water in El-Santa Gharbia region (Nile water) had a lowest salt content. Good quality water has the potential for producing maximum yield. Poor quality water can cause reduced yield unless special management practices are adopted.

Table (1): Water analysis (meq/L.) under two regions of investigation.

Regions	E.C	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	Co_3^{2-}	HCo_3^{-}	So_4^{2-}	Cl^{-}
El-Santa Gharbia (1)	0.40	1.55	0.62	2.1	0.23	0.0	2.0	1.90	0.50
Nobaria Behyra (2)	0.60	2.2	1.90	2.5	0.20	0.0	3.6	1.60	1.40

1= Nile water **2= Under ground water**

Excellent water for grapes was:

- EC less than 1mmhos/cm, Excess EC=1 mmhos /cm may still be satisfactory if special management practices are adopted.
- Sodium (meq/L) less the 20 – Chloride (meq/L) < 1, Bicarbonate (1.5 – 7.5).

According to: Division of Agricultural Sciences University of California: printed December (1978).

As for analytical data of the soil under experimental vines data in table (2) revealed that soil in El-Santa Gharbia contain a high nutrient elements under soil analysis in comparison with the other region (Nobaria Behyra). Also soil in the first region classived as clay soil. This type of soil has a good water holding and nutrient. Supplying ability, but they have slow water intake and poor aeration which may greatly limit root depth and root distribution. While soil in the second region classified as a sandy soil, this soil have poor water holding and nutrient supplying ability, but good aeration may allow good roots distribution in horizontal and vertical.

Table (2): Analytical data of the soil under experimental vines:

Partical size distribution	Regions	
	El-Santa Gharbia	Nobaria Behyra
Sand %	7.5	82.4
Slilt %	23.6	11.2
Clay %	68.9	6.4
Texture	Clay	Sandy
pH (1 : 2.5 extract)	7.55	7.86
E.C (1 : 2.5 extract)	1.1	1.40
O. M. %	1.3	0.40
Total Ca Co_3	4.2	22.1
Total N %	0.18	0.12
P (ppm, Olsen)	36.1	3.4
K (ppm, ammonium acetate)	420	140

Phonological stages of Crimson seedless grapevines and its heat requirements:

Data in table (3) revealed that a remarkable variation in duration period (in days) of phonological stages of Crimson seedless vine cultivar between the two regions under investigation, which was different climatic . Sapmovement started on 3 and 9 March at El-Nobaria region in seasons 2009 and 2010 respectively(with average Mar.th6), while Sapmovement occurred at El-Santa Gharbia on 20 and 24 March in the two studied seasons respectively (with average Mar.th22), and therefore, El-Nobaria region advanced Sapmovement by 16 days compared to El-Santa region as an average in two seasons. This may be due to Sapmovement depending on the temperature around the root zone, Kliewer (1977).

Concerning the budburst date in the two regions of study data in table (3) indicated that budburst in El-Nobaria region was earlier compared to El-Santa region by about 22 days as an average in seasons of study. Where occurred in 13 and 17 March (with average Mar.th15) in El-Nobaria region , while El-Santa Gharbia region budburst started on 3 and 9 April (with average Apr. th6) in the two studied seasons respectively.

Table (3): Phonological phases of Crimson Seedless grapevines at two different regions in A.R.E.

Regions	Season	Sapmove-ment date	Budburst date	Flowering date			Beginning of ripening date	Harvesting date
				Beginning	Full bloom	End		
El-Santa (Gharbia)	2009	20/3	3/4	6/5	22/5	26/5	17/10	14/11
	2010	24/3	9/4	10/5	25/5	28/5	19/10	21/11
	Average	22/3	6/4	8/5	24/5	27/5	18/10	18/11
El-Nobaria (Behyra)	2009	3/3	13/3	21/4	24/4	1/5	18/8	1/9
	2010	9/3	17/3	23/4	28/4	4/5	22/8	4/9
	Average	6/3	15/3	22/4	26/4	3/5	20/8	3/9
	*Earliness In days	16	22	16	28	24	59	76

***Earliness = number of days were earliness of phonological stages of Crimson seedless cv. grown in Santa region compared to Nobaria region (Average in Santa – Average in Nobaria).**

This variation may be due to the local climate and seasonal weather changes in season, also climate factors, particularly temperature, have long been recognized to have a major factor in this respect. The improving effect of temperature on budburst is supported by the result of Howell (2000) who mentioned that when the mean daily temperature reached about (10^{o}C) for five consecutive days, the buds begin to swell and the green or red leaves emerge from them. This is commonly known as bud break.

The average duration period required from Sapmovement to budburst were 9 and 16 days in Nobaria and El-Santa Gharbia regions respectively. The difference due to El-Nobaria region have bright warm weather than El-Santa Gharbia. The results of Kliewer (1977) supported the beneficial effect of high temperature on advanced Sapmovement and budburst date in grapevines.

Regarding the flowering date, data in tables (3 and 4) indicated that flowering stage started in El-Nobaria region on April 21 and 23 and extended to May 1 and 4, the period of flowering prolonged to 11 and 12 days in seasons 2009 and 2010 respectively. While in El-Santa Gharbia region the flowering stage started on May th 6 and May th10 and extended to 20 and 18 days in the two studied seasons respectively. The data illustrated that El-Santa Gharbia region delayed flowering stage (full bloom) by 28 and 27 days compared to El-Nobaria region in the two studied seasons respectively. The variation attributed to bright warm and brings weather during flowering stage.

The average duration period from beginning of flowering up to beginning of ripening extended 115 and 144 days for vines grown at El-Nobaria and El-Santa Gharbia vineyards respectively, and therefore first region (Nobaria) needed to less number of days for this stage than second region. This findings agreement with Kliewer (1977) who mentioned that temperature is the more important environmental factors that ovule fertility and fruit set in grapevines. Day temperatures between 20º and 30º c with night temperature between 10º to 20º C are generally considered optimal for ovule fertility and fruit-set in grapevines. Also low day temperatures between 10 and 18º C and high temperatures of 33º c or greater during bloom greatly reduced fruit-set in grapevines.

Regarded to beginning of ripening data in table (3) indicated that fruit ripening date was varies greatly with grapevine climate and geographic region, Nobaria region advanced beginning of ripening and harvesting date compared to El-Santa Gharbia region. Data in table (3) showed that the beginning of fruit ripening occurred in August 18 and August 22 in Nobaria region in seasons 2009 and 2010 respectively, while, beginning of fruit ripening of vines grown at El-Santa Gharbia region occurred in October 17 and October 19 in both studied seasons respectively.

Data in Tables (3 and 4) showed that harvesting date of the studied vine cultivar in Nobaria region was Sep. st1 and Sep. th4 in seasons 2009 and 2010 respectively, and in El-Santa Gharbia was Nov.th14 and Nov.th 21 in the two studied seasons respectively. The differences between the harvesting dates for the vineyards of both location was 76 days. Harvest date in El-Nobaria region was begins early by a 76 days than El-Santa region, whereas the El- Nobaria was unfavorable for Crimson Seedless grape, because the marketplace was crowded with another grapes varieties and therefore Crimson grape was unmarketable in this time.

Average period from beginning of fruit ripening to the harvest was 14 and 31 days for El-Nobaria and El-Santa Gharbia regions respectively. This variation in harvest date due to the climate factors, particularly temperature is consider the maintenance factor influence on the fruit ripening. Also heat summation (degree days) and sunlight leaves exposure increased photosynthate assimilates thus the majority of foods and food materials are first sent to actively growing area such as developing fruit, Howell (2000). This findings agreement with Williams *et al.* (1994), they mentioned that the rate of photosynthesis in grapevines is also influenced by leaf temperature, the apparently broad optimum ranged of 25– 35ºC may be attributed to differences in grape variety, growing conditions or seasonal variation.

Data in table (4) indicate the existence of significant differences between the two studied regions for the average period between budburst date and harvest date , where the period were 165 days in the Nubariya region, while it was 241 days in the El-Santa Gharbia region , on the contrary, no significant differences between the two regions for the average heat requirements during this period, where, the heat units for this period were 3704 and 3625 heat units in the two studied region respectively. This results agreement with Girgis *et al.* 2002) and Marwad *et al.* (1994) on some grapevines cultivars grown under Nobaria conditions. Also this findings consedance with Marwad *et al.* (1994) on some introduced grape cultivars under El-Kanater (Kalyobia Governorate Egypt) conditions.

Effect of heat requirements on number of days for phonological stages:

Data in table (4) show that variation in number of days for phonological stages of Crimson Seedless grapevines in the two studied regions. El-Santa Gharbia region delayed Sapmovement by about 16 days (table 3) as an average in the two studied seasons. Also the period from Sapmovement to budburst was 14 and 17 days in both seasons respectively, and El-Nobaria region advanced budburst by 22 days as an average (table 3) of the two seasons. Heat summations for the period from Sap-movement to budburst were 163 and 173 heat units in El-Nobaria and El-Gharbia region respectively(table 4). This may be due to warmer condition in El-Nobaria region. This result agreement with Girgis *et al.* (2002) on some grapevines cultivars under Nobaria conditions. Also El-Nobaria region advanced flowering stage by about 24 days in average two seasons, this advancement attributed to the heat summation in El-Nobaria was higher than the other region table (4). Enhance in Veraison was associated with higher accumulation in El-Nobaria condition (beginning of berries ripening). This may be due to rapid physiological growth reduced the period between growth stages from Sapmovement to Veraison. Thus El-Nobaria region advanced the beginning of berries ripening than El-Santa Gharbia region in two seasons of study. The findings agreement with Gergory and Robert (2000), they mentioned that earlier heat summation reduced phonological phases in grapevine cycle.

Table (4): Number of days and heat summation for phonological phases of Crimson Seedless at two different regions in A.R.E.

The phonological phases	El-Santa (Gharbia)						El-Nobaria (Behyra)					
	2009		2010		average		2009		2010		average	
	Days	Heat units	Days	Heat units	Days	Heat units	Days	Heat units	Days	Heat units	Days	Heat units
Sapmovement-budburst	14	184	17	162	16	173	10	176	9	196	9	163
Budburst-beginning of flowering	33	407	31	449	32	428	31	396	30	397	31	397
Beginning of flowering-end of flowering	20	298	18	313	19	306	11	333	11	306	11	320
End of flowering-beginning of berries ripening	144	2545	144	2685	144	2615	120	2465	110	2845	115	2655
beginning of berries ripening-harvesting	28	331	33	380	31	356	14	290	13	347	14	319
Budburst-harvesting	239	3581	242	3827	241	3704	164	3404	165	3845	165	3625
Sapmovement-harvesting	225	3765	226	3989	226	3877	182	3580	179	3975	181	3778

As for harvesting data in table (4) showed that climate under El-Nobaria condition reduced number of days for harvesting by about 76 days than El-Santa Gharbia region. This may be due to climate influences in the timing of individual events showed that similar parameters influenced Sapmovement, budburst, flowering, Veraison and harvest. The timing of flowering was influenced by precipitin and hours of in solution during the budburst to flowering interval. Also temperatures greater than 30ºc during flowering and Veraison advanced harvest, Gergory and Robert (2000). From data in table (4) showed that, the average period of time from budburst until harvesting was 241 and 165 days and heat summations were (3704 and 3625 heat units) in El-Santa Gharbia and El-Nobaria Behyra respectively in their two-year studied seasons.

Also the period in days from Sapmovement to harvesting averaged 226 to 181 days in two studied region. El-Santa region delayed harvesting date by about 76 days than El-Nobaria region. This due to variation in climate in two regions.

From our data, heat summations play an important role in relationships to vine physiology, production and quality.

Vegetative growth of Crimson Seedless grapevines at two different regions in A.R.E.

Data in table (5) clearly show that vegetative growth like as leaf area, vine area and shoot length of Crimson grapevines grown under Nobaria and El-Santa Gharbia regions were significantly affected by the local climatic and the vines grown in El-Santa Gharbia had a higher significant values comparison the vines grown under Nobaria region in two seasons of study this may be due to high temperature in Nobaria region which affected on photosynthesis capacity Howell (2000) mentioned that the rate of photosynthesis at temperature blow 20ºc is less than that at 25º to 30ºc due to both lower activity of carboxylating enzymes and photochemical activity and the optimum temperature for photosynthesis by grape leaves is 25º to 30ºc. Also photosynthesis declines rapidly above 30ºc and fall to nearly zero at 45ºc. Optimum temperature improved growth and development of all parts of the vine, since translocation of carbohydrates subsequent metabolism in root, shoots and fruits might operate best. This findings agreement with Gregory and Robert (2000) on Merlot and Cabernet Sauvignon varieties.

Table (5): Vegetative growth of Crimson Seedless grapevines at different regions in A.R.E.

Regions	Leaf area (cm^2)		Vine area (m^2)		Shoot length (cm)		Pruning weight(kg)/vine		Coefficient of wood ripening	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
El-Santa (Gharbia)	198.6	218.2	18.6	21.6	240.2	256.1	2.4	2.6	90.8	91.7
El-Nobaria (Behyra)	190.2	210.1	16.2	19.4	198.2	210.1	1.9	2.2	83.0	86.0
New L.S.D at 5%	2.8	2.7	1.8	1.9	10.8	11.2	0.02	0.01	3.6	2.8

From table (5) it is obvious that pruning weight (kg/vine), positively influenced by Crimson grapevines grown in different regions and El-Santa region had a significant values in this respect in two seasons of study. Also data revealed that relationships between climate and grapevine growth, also optimum sunshine and temperature (25º-30ºc) promoted photosynthetic assimilation, highest sunshine and lowest moisture (in El-Nobaria) photosynthesis rate reduce, Gergory and Robert (2000) mentioned that under favorable conditions leaves generally have the capacity to photosynthesize faster as the demand for their products increases. Photosynthesis declines rapidly above 30ºc and falls to nearly zero at 45ºc. Additionally competitive between high yield/vine (in El-Nobaria region) and reservoir carbohydrates reduced pruning wood/vine and coefficient of wood ripening, El-Mogy (2006) on some grape cultivars.

Effect of heat requirement on: Chemical berries characteristics of Crimson Seedless grapevines.

Table (6) reveal that the quality of the Crimson berries positively affected by the different regions and the vines grown in El-Santa Gharbia region where the clay soil and optimum temperature (at day and night) and moderate sunlight had more significant values in Crimson berries SSC %, acidity and anthocyanin skin berries content comparison with the vines grown under Nobaria region where sandy soil and high day temperature and low night temperature. This finding agreement with results of Kliewer (1974) found that Cardinal and Tokay fruits ripened at 15ºc day temperature had SSC % generally equal to or greater than those of fruits ripened at 35ºc at either 15º to 25ºc night temperature, also night temperature usually had relatively little effect on SSC % of the different cultivars.

Also SSC % were high values when night temperature was less than day temperature i.e. 25º/20ºc compared with 25º/30ºc and 25º/15ºc compared with 25º/25ºc.

As for anthocyanin in berry skin: Red and black grapes owe their attractive color to their anthocyanin pigments. Anthocyanin level in grape skins are one of the few parameters available for evaluating grape quality. These levels are influenced by several environmental factors, Like as air temperature Kliewer (1977). Our data in table (6) show that coloration of berry grape grown under El-Santa Gharbia region, where moderate temperature of day and night and clay soil, the coloration were favorable than El-Nobaria region where high temperature and sunlight. This results are supported by the results of Kliewer (1977) who found that anthocyanin in berry skin at day/night temperature of 37º/32ºc no anthocyanin where formed in fruits high light (HL; 65.5% sunlight) or low light (LL; 9.5% sunlight), also Kliewer (1977) found that the levels of anthocyanin in the fruits of several grape cultivars were much higher with 25º/15ºc than with 30º/15ºc day/night temperature. Warm days (25ºc) and hot nights (30ºc) either completely inhibited the formation of anthocyanin. Environmental factors that favor accumulation of carbohydrates in plant tissues have been generally associated with enhanced anthocyanin synthesis the effect of high day or night temperature in decreasing or blocking anthocyanin.

On contrary in many instances, SSC % in the synthesis could not be attributed to lower levels of sugars in berry juice. Juices were higher when coloration was poor or absent than when coloration was good. This occurs in Crimson grape grown in Delta Egypt, (El-Santa Gharbia region).

Finally Howell (2000) have shown that light is necessary for anthocyanin formation in some of the lighter – colored grapes developed no visible color when matured in the dark. As for total canes carbohydrates content percentage. Data in table (6) show that canes of grapevines grown under El-Santa Gharbia region had significant values than vines grown under El-Nobaria region respectively in two seasons of study this may be due to in El-Santa Gharbia region the vines grown in clay soil and under favorable conditions and therefore leaves generally have the capacity to photosynthesize faster as the demand for their products increases and accumulation of carbohydrates in canes have been generally increase. This result is supported with findings of El-Mogy (2006) on some grape cultivars.

Table (6): Effect of heat requirement on SSC %, acidity % in berry juice, anthocyanin in berry skin (g/100 g fresh weight) and total cane carbohydrates % of Crimson Seedless grape vines at two different regions in A. R. E.

Regions	SSC %		Acidity %		Anthocyanin in berry skin (g/100g fresh weight		Total cane carbohydrates %	
	2009	2010	2009	2010	2009	2010	2009	2010
El-Santa (Gharbia)	18.4	18.5	0.56	0.58	27.8	26.9	22.4	23.6
El-Nobaria (Behyra)	17.1	17.0	0.61	0.65	30.5	29.8	21.3	22.5
New L.S.D at 5%	0.2	0.3	0.04	0.06	0.7	0.8	0.6	0.6

Effect of heat requirement of Crimson Seedless grapevines on: SSC percentage and coloration dynamics:

Data in table (7) show that soluble solids percentage and anthocyanin were significantly greater than in fruits ripened under regions of study. Total soluble solids and anthocyanin were significantly less in berries that ripened under El-Nobaria condition, the reduced fruit coloration and SSC % in this condition was attributed to mainly to day and night hot temperature, Kliewer (1974) found that a day temperature of 35ºc completely inhibited anthocyanin synthesis in Tokay berries regardless of night temperature. Also, a 30ºc night temperature (day temperature 25ºc) prevent anthocyanin formation in Tokay and greatly reduced the coloration of "Cobernet Sauvignon" compared with fruits ripened at 15ºc and 20ºc night temperature. In our condition we noticed that El-Nobaria region had more high day and night temperature (heat summation) table (4), additionally strong sunshine more day reduce photosynthesis capacity and sunlight exposed fruits generally inhibit higher concentration of sugars anthocyanin, and total aroma in berries Kliewer (1974). Also data in table (7) show that fruits grown in Nobaria region and at all coloration samples (Veraison, 25%, 50%, 75% and 100% coloration), SSC percentage was lower. In contrast grape fruits grown in El-Santa Gharbia had excellent SSC percentage in all samples collected for SSC %. This was true and agreement with Kliewer (1974) found that, the effects of high day or night temperature in decreasing or blocking anthocyanin synthesis could not be attributed to lower level of sugars in the berry juice. In many instances, SSC in the juice were higher when coloration was poor or absent than when coloration was good.

7-8

Effect of heat requirement of Crimson Seedless grapevines on the physical properties of the yield:

Local climate play significant roles in grapevines growth, production and quality, also climatic component and milder conditions during critical growth stages has occurred, increasing the likelihood that the run of good vintages and will continue, Gergory and Robert (2000). Data in table (8) showed that grapevines grown under El-Nobaria region resulted in a positive effects on berry set %, number of berries / cluster, cluster length, cluster weight and yield per vine in comparison with the grapevines grown in El-Santa region. These differences attributed to the yield components responsible for reduced, poor fruit set and or smaller berry and cluster size. Although the number of clusters were adjusted to 28 cluster/vine during the study in two seasons to avoid any effect of differences in No. of cluster / vine and therefore the reduction in yield/vine due to fruit set %, number of berries / cluster and cluster weight. Additionally, longer growing seasons (budburst to harvest) generally resulted in lower production, also clusters on sun canes are almost invariably larger than clusters on shade canes, Gergory and Robert (2000). Also they mentioned that earlier phonological timing produced a riper and larger crop. Combined these relationships and our data from table (8) indicated that grapes grown under El-Nobaria region enhanced physical properties significantly than grapes grown under El-Santa Gharbia region. In additional vines of El-Nobaria region grown in a sandy soil and have a good roots growth specially lateral roots, which provides an important means to increase the possibility of absorption of water and nutrients. Also the roots consider one of the source of hormones, specially Cytokines and Gibberellins that regulate processes of growth, Pire and Diez (2006). Its consider reasonable explanation.

As for cluster compactness data from table (8) indicated that vine grown under El-Nobaria region enhanced cluster length with highest number of berries in compare with El-Santa region, and therefore cluster was compactness in vine grown under El-Santa Gharbia region.

Concerning average yield per vine and per feddan from grape fruit and from the yield component, data from table (8) showed that, under El-Nobaria region we noticed that increased in average yield (Ton) per feddan than El-Santa region. But delayed crop maturation under El-Santa condition increased the profit net (L.E) / feddan than El-Nobaria conditions. Thus the first step in the production of high-quality from Crimson Seedless grape is the selection of a site with appropriate climatic characteristics for a good fruit ripening of the varieties to be grown.

Conclusion: the first step in the production of high quality of grapes is the selection of a region with appropriate climatic characteristics for a good fruit ripening of Crimson Seedless grape.

From the results obtained show that the climatic and environmental conditions in El -Santa -Gharbia region and similar regions of the Delta was the best regions suitable for growing Crimson Seedless vine cultivar, which gave the best results for the quality of the crop and time appropriate to the maturity and harvest

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الاحتياجات الحراريه لكروم العنب الكريمسون و علاقتها بالنمو و الاثمار في بعض المناطق المختلفه في جمهوريه مصر العربيه.

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أجريت هذه الدراسه خلال موسمي ٢٠٠٩ , ٢٠١٠ علي كرمات عنب كريمسون سيدلس في موقعين مختلفين أحدهما بالسنطه - غربية بوسط الدلتا حيث الأرض طينيه و الاخر بالنوباريه – بحيره حيث الأرض الجديده الرمليه و مسافة الزراعه بالمزرعتان ١,٥× ٣ متر بين الكرمات و الصفوف و طريقة التدعيم جيبل في المزرعتين و قد تم توحيد عدد العناقيد للكرمه ب ٢٨ عنقود في كلا الموسمين. كان الهدف من الدراسه تقدير الاحتياجات الحراريه لصنف العنب الكريمسون و علاقه ذلك بدوره النمو السنويه للكرمات و تأثيرها علي النمو و الصفات الطبيعيه و الكيماويه و العائد من الفدان في نهايه الدراسه.

و قد أظهرت النتائج مايلي:

تحت ظروف منطقه النوباريه كان سريان العصاره و تفتح البراعم و التزهير و نضج المحصول أكثر تبكيرا منها تحت ظروف السنطه غربية. كذلك كانت الاحتياجات الحراريه للكرمات في منطقه النوباريه أقل منها في الغربيه و قل موسم النمو في المنطقه الأولي عنها في المنطقه الثانيه.

تحت ظروف السنطه غربيه كانت الصفات الطبيعيه و الكيماويه للمحصول أفضل منها في منطقه النوباريه

كان لظروف الطقس في السنطه غربيه أثر إيجابي في زياده دخل المزارع تمثل في تأخير النضج و تحسين الصفات الطبيعيه و الكيماويه للمحصول.

و عليه فإننا نوصي بزراعه العنب الكريمسون سيدليس في منطقه الدلتاو ما يشابها للاستفاده منه حيث أن بطبيعته متأخر النضج و زراعته في هذه المناطق تكسبه ميزه نسبيه حيث أنه يحصد في شهر أكتوبر و قد يزيد عن ذلك فلا يوجد منافس له.

قام بتحكيم البحث

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Table (7): SSC % and coloration dynamics of Crimson Seedless grape at two different regions in A.R.E.

Regions	Versaion		25% coloration		50% coloration		75% coloration		100% coloration	
	SSC %		SSC %		SSC %		SSC %		SSC %	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
El-Santa (Gharbia)	13.2	13.6	15.3	15.6	16.3	16.6	18.2	18.5	19.2	20.7
El-Nobaria (Behyra)	10.1	11.0	11.4	12.1	12.6	13.5	14.3	14.5	16.0	16.1
New L.S.D at 5%	1.8	2.1	2.6	2.9	3.1	3.0	3.8	3.8	3.1	3.7

Table (8): Physical properties and profit net (L.E.)/feddan of Crimson Seedless grape at two different regions in A.R.E.

Regions	Berry set%		No. of berries/ cluster		Cluster length(cm)		Cluster compactness		Cluster weight(gm)		Yield/ vine (kg)		Average yield of two seasons		Average price of (ton) grape	Average net profit (L.E)/feddan
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	Kg/ vine	Ton/ Fe.		
El-Santa (Gharbia)	8.1	9.2	106	118	18.2	19.8	5.8	6.0	309.0	320.0	8.7	9.0	8.9	8.3	5100	42.3
El-Nobaria (Behyra)	9.4	9.5	130	145	24.6	25.8	5.3	5.6	350.0	365.0	9.8	10.2	10.0	9.3	3750	34.9
New L.S.D at 5%	0.8	0.2	16.0	20.0	3.8	4.2	0.05	0.04	32.0	34.0	0.9	0.6	0.5	0.4		