

STUDIES ON GROWING DEGREE DAYS REQUIRED FOR GROWTH AND FRUITING OF SOME PEACH TREES

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ABSTRACT

The present study was carried out during two successive seasons (2004 and 2005) to evaluate different cultivars of Peach namely "Florda Prince", "Florda Gold" and "Early Grand" under different environmental conditions in two locations in El-Wahat El-Baharaia and El-Badrashin Giza, Egypt. The trees under study were 12 years old, budded on Nemagard Rootstock; The planting distances were (5 X 5m). The evaluation included the Growing Degree Days needed for bud burst, flowering, fruit set, harvesting using base temperature (4.4°C) and comparison between all cultivars in the two locations. Data indicated that "Florda Gold" cultivar required higher G.D.D. for bud burst, flowering, fruit-setting and harvesting than that observed in both "Florda Prince" and "Early Grand" cultivars. Whereas "Early Grand" cultivar need, the lowest G.D.D.. Both Bud burst and Flowering need more G.D.D. in the first location than the second one. However in "Florda Prince" and "Florda Gold" cultivars the G.D.D. need for Fruit set was more in the first location than the second one. On the other hand, in all cultivars harvesting need more G.D.D. in the second location than the first one.

INTRODUCTION

Peach [*Prunus persica* (L.) Batsch] belongs to the family "Rosaceae" originated in China. Peach is considered as one of the most important fruits in the world. It ranks second to apple among temperate zone deciduous fruit trees from the standpoint of production and value, Childers (1978). Area of Peach trees grown in Egypt is about 79199 Feddan most of them located in North Sinai, and Dakahlia Governorate, producing 360937 tons. (Ministry of agriculture in 2004). On the other hand, Haun & Coston (1985) indicated that there was a relationship between daily growth and development of Peach leaves and environmental factors, as they observed that maximum and minimum temperature, precipitation, soil moisture and age were the most important variables for the leaf growth prediction equation.

While, Crocker & Sherman (1996) reported that temperatures above 70°F during the chilling period appear to be detrimental of low chilling Peach cvs.. Also, the tree of "Florida Belle", "Florida Prince" and "Florida Beauty" cultivars have a chilling requirement of 150 hours at or below 45°F. Scalabrelli & Couvillon (1986) illustrated that 7.2°C was more effective of "Redhaven" Peach than 3 or 2°C in releasing buds from dormancy. Prolonged chilling (2040 h) decreased the growing degree hours (GDH) required for vegetative bud opening regardless of temperature, however, the GDH required for flower bud opening was decreased only by prolonged chilling at 7.2°C. Shaltout (1987) stated that "Florida Prince" cultivar required

about 15000 and 43450 GDH from time of dormancy termination till full bloom and fruit maturity respectively. Also, Mansour & Stino (1987) found that "Florida Prince" cultivar has winter chilling requirements of about 150 hours below 7.2°C. Ali (1988) recorded that correlated temperature prevailing during the growing season with total time from bloom to harvest for Royal apricot and derived relative efficiencies of temperatures (in 2.5°F increments) in promoting apricot fruit development. Also, the minimum apparent efficiency occurred at about 42.5°F and the optimum at 72.5°F, while the efficiency at 105°F was equivalent to that at 52.5°F or about 33% of optimum. Efficiencies of 77% or higher were obtained at temperatures from 60 to 87.5°F. Petri & Stuker (1990) indicated that on young apple trees, cold storage for 45 and 60 days at 2 or 6°C was the best treatment to break bud dormancy, but storage periods of less than 30 days were not sufficient and required additional chemical treatment. Moreover, Haugge & Cummins (1991) demonstrated that the efficiency of chill units (CU) accumulation to break dormancy of apple was negatively correlated with low chilling requirement (CR) cultivar and depth of dormancy which indicate the importance of factors other than (CU) accumulation in terminating bud dormancy in low-CR cultivar. Stino (1991) found that, chilling needed for dormancy breaking of "Anna" cultivar lateral buds in the greenhouse conditions ranged between 150 – 200 hours \leq 7.2°C, but apical buds of the same cv. did not need any chilling. Also, in this trend the growing degree hours required for apical bud burst of apple was always lower than that required for lateral buds. Young apple trees with their roots at 20°C have significantly increased of bud break % compared with those roots at 10°C. Nishimoto & Fujisaki (1995) noticed that chilling requirement estimated as the hours of \leq 7.0 °C was deemed to have been satisfied when 70% bud burst occurred within 30 days in an incubator at 20 °C, the (CR) of cutting and potted trees of "Chiyoime" peach were 965 and 952 h. respectively. On the other hand, El-Agamy *et al* (2002) reported that chilling units according to total hours \leq 7.2 °C were 275, 294 and 323 for "San Pedro", "Y9/106" and "Rubidoux" peach cvs, respectively from Dec. till bud swelling at the field. These units were (632, 697 & 837) and (187, 177 & 62) according to total hours \leq 10 °C and Utah model, respectively. Concerning heat units for bud break till fruit maturity, it was found that accumulated heat units (GDH) were higher in "Rubidoux" cv. than in both "San Pedro" and "Y9/106" cvs.

MATERIALS AND METHODS

The present study was carried out during two successive seasons 2004 and 2005 to evaluate different cultivars of Peach namely "Florida Prince", "Florida Gold" and Early Grand" under the Egyptian conditions in two locations at El-Wahat El-Baharaia and El-Badrashin. The cultivars under study were 12 years old. The planting distance were (5 x 5 m), budded on Nemagard rootstock. Trees were divided into five replicates each one included three trees.

The environmental condition in the first location (El-Wahat El-Baharaia):

Month	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Max. temp.	21.5	24.0	27.3	28.3	32.3	34.8	36.0	37.0	33.3	33.0	25.8	22.0
Min. temp.	7.0	9.0	11.3	11.5	14.3	15.3	17.0	19.5	18.3	18.0	12.8	7.3
RH %	50.0	49.0	45.0	43.0	39.0	40.0	45.0	50.0	52.0	51.0	52.0	60.0
Rain (mm)	3.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	4.0	4.0
Wind (m/s)	1.7	1.9	2.2	2.0	1.8	1.5	1.7	1.6	1.5	1.5	1.4	1.5

The environmental condition in the second location (El-Badrashin):

Month	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Max. temp.	19.3	21.0	24.0	28.3	31.0	33.3	34.0	35.0	31.0	30.0	23.5	19.5
Min. temp.	8.8	8.5	11.0	13.0	16.0	17.5	20.5	22.5	22.5	22.3	13.3	9.8
RH %	58.0	55.0	50.0	48.0	45.0	49.0	53.0	55.0	57.0	59.0	56.0	68.0
Rain (mm)	6.0	2.0	5.0	1.0	2.0	0.0	0.0	0.0	0.0	2.0	8.0	5.0
Wind (m/s)	1.4	1.6	1.9	1.7	1.5	1.2	1.5	1.3	1.2	1.2	1.1	1.3

Prevailing temperature (°C) in both farms during 2004 season

Year	Farm	2004							
		El badrashen				Wahat baharia			
Temp. Date		Maxi. temp.	Mini. temp.	Average temp.	G.D.D.	Maxi. temp.	Mini. temp.	Average temp.	G.D.D.
1-7/1	1	19	09	14	9.6	22	06	14	9.6
8-15/1	2	17	08	12.5	8.1	19	07	13	8.6
16-23/1	3	20	09	14.5	10.1	22	07	14.5	10.1
24-31/1	4	21	09	15	10.6	23	08	15.5	11.1
1-7/2	1	21	08	14.5	10.1	23	08	15.5	11.1
8-15/2	2	22	10	16	11.6	25	10	17.5	13.1
16-23/2	3	20	07	13.5	9.1	24	09	16.5	12.1
24-29/2	4	21	09	15	10.6	24	09	16.5	12.1
1-7/3	1	23	10	16.5	12.1	26	11	18.5	14.1
8-15/3	2	24	11	17.5	13.1	28	11	19.5	15.1
16-23/3	3	24	11	17.5	13.1	27	12	19.5	15.1
24-31/3	4	25	12	18.5	14.1	28	13	20.5	16.1
1-7/4	1	25	12	18.5	14.1	28	10	19	14.6
8-15/4	2	31	13	22	17.6	29	12	20.5	16.1
16-23/4	3	31	13	22	17.6	27	11	19	14.6
24-30/4	4	26	14	20	15.6	29	13	21	16.6
1-7/5	1	30	15	22.5	18.1	32	13	22.5	18.1
8-15/5	2	33	16	24.5	20.1	34	14	24	19.6
16-23/5	3	30	16	23	18.6	31	15	23	18.6
24-31/5	4	31	17	24	19.6	32	15	23.5	19.1
1-7/6	1	31	17	24	19.6	32	14	23	18.6
8-15/6	2	34	18	26	21.6	36	16	26	21.6
16-23/6	3	34	17	25.5	21.1	36	16	26	21.6
24-30/6	4	34	18	26	21.6	35	15	25	20.6
1-7/7	1	34	19	26.5	22.1	36	15	25.5	21.1
8-15/7	2	33	21	27	22.6	34	17	25.5	21.1
16-23/7	3	33	20	26.5	22.1	36	17	26.5	22.1
24-31/7	4	36	22	29	24.6	38	19	28.5	24.1
1-7/8	1	36	22	29	24.6	39	19	29	24.6
8-15/8	2	36	23	29.5	25.1	38	20	29	24.6
16-23/8	3	34	23	28.5	24.1	36	20	28	23.6
24-31/8	4	34	22	28	23.6	35	19	27	22.6
1-7/9	1	34	22	28	23.6	35	18	26.5	22.1
8-15/9	2	33	23	28	23.6	36	17	26.5	22.1
16-23/9	3	31	25	28	23.6	33	20	26.5	22.1
24-30/9	4	26	20	23	18.6	29	18	23.5	19.1
1-7/10	1	30	22	26	21.6	33	18	25.5	21.1
8-15/10	2	30	24	27	22.6	35	17	26	21.6
16-23/10	3	29	23	26	21.6	32	20	26	21.6
24-31/10	4	31	20	25.5	21.1	32	17	24.5	20.1
1-7/11	1	27	15	21	16.6	30	14	22	17.6
8-15/11	2	22	15	18.5	14.1	25	13	19	14.6
16-23/11	3	23	12	17.5	13.1	25	14	19.5	15.1
24-30/11	4	22	11	16.5	12.1	23	10	16.5	12.1
1-7/12	1	21	11	16	11.6	24	09	16.5	12.1
8-15/12	2	22	11	16.5	12.1	24	08	16	11.6
16-23/12	3	20	09	14.5	10.1	22	07	14.5	10.1
24-31/12	4	15	08	11.5	7.1	18	05	11.5	4.1

On the first week of January (2004 and 2005 seasons) 20 shoots per each tree were chosen at random. The time of bud burst, flowering, fruit set, harvest and leaf fall were recorded. The Growing degree days was determined in the two seasons as follows:

$$\text{G.D.D.} = (\text{Max} + \text{Min}) / 2 - \text{BT}$$

Max: Maximum temperature.

Min : Minimum temperature.

BT : Base temperature = 4.4°C

(Perry et al., 1986) and (El-Shekh, 2001).

Prevailing temperature (°C) in both farms during 2005 season

Year		2005							
Farm Temp. Date	El badrashen				Wahat baharia				
	Maxi. temp.	Mini. temp.	Average temp.	G.D.D.	Maxi. temp.	Mini. temp.	Average temp.	G.D.D.	
1 - 7 / 1 1	18	09	13.5	9.1	21	05	13	8.6	
8 - 15 / 1 2	15	07	11	6.6	17	05	11	6.6	
16-23 / 1 3	19	09	14	9.6	21	06	13.5	9.1	
24-31 / 1 4	20	08	14	9.6	22	07	14.5	10.1	
1 - 7 / 2 1	22	08	15	10.6	23	07	15	10.6	
8 - 15 / 2 2	20	09	14.5	10.1	23	08	15.5	11.1	
16-23 / 2 3	20	09	14.5	10.1	23	07	15	10.6	
24-28 / 2 4	23	10	16.5	12.1	26	08	17	12.6	
1 - 7 / 3 1	25	11	18	13.6	28	10	19	14.6	
8 - 15 / 3 2	24	11	17.5	13.1	27	09	18	13.6	
16-23 / 3 3	25	12	18.5	14.1	28	10	19	14.6	
24-31 / 3 4	27	14	20.5	16.1	30	11	20.5	16.1	
1 - 7 / 4 1	24	12	18	13.6	27	09	18	13.6	
8 - 15 / 4 2	28	11	19.5	15.1	31	10	20.5	16.1	
16-23 / 4 3	30	13	21.5	17.1	27	10	18.5	14.1	
24-30 / 4 4	31	15	23	18.6	33	11	22	17.6	
1 - 7 / 5 1	29	15	22	17.6	32	11	21.5	17.1	
8 - 15 / 5 2	32	14	23	18.6	35	12	23.5	19.1	
16-23 / 5 3	31	16	23.5	19.1	34	13	23.5	19.1	
24-31 / 5 4	32	16	24	19.6	34	12	23	18.6	
1 - 7 / 6 1	33	18	25.5	21.1	36	14	25	20.6	
8 - 15 / 6 2	33	17	25	20.6	36	15	25.5	21.1	
16-23 / 6 3	35	18	26.5	22.1	38	15	26.5	22.1	
24-30 / 6 4	35	18	26.5	22.1	37	13	25	20.6	
1 - 7 / 7 1	36	20	28	23.6	39	15	27	22.6	
8 - 15 / 7 2	36	22	29	24.6	39	18	28.5	24.1	
16-23 / 7 3	34	21	27.5	23.1	36	17	26.5	22.1	
24-31 / 7 4	35	22	28.5	24.1	38	19	28.5	24.1	
1 - 7 / 8 1	38	25	31.5	27.1	40	21	30.5	26.1	
8 - 15 / 8 2	37	24	30.5	26.1	40	20	30	25.6	
16-23 / 8 3	35	22	28.5	24.1	38	21	29.5	25.1	
24-31 / 8 4	34	21	27.5	23.1	37	19	28	23.6	
1 - 7 / 9 1	33	22	27.5	23.1	36	18	27	22.6	
8 - 15 / 9 2	32	21	26.5	22.1	36	16	26	21.6	
16-23 / 9 3	31	22	26.5	22.1	33	19	26	21.6	
24-30 / 9 4	25	20	22.5	18.1	28	16	22	17.6	
1 - 7 / 10 1	29	20	24.5	20.1	32	17	24.5	20.1	
8-15 / 10 2	28	21	24.5	20.1	31	16	23.5	19.1	
16-23/10 3	26	20	23	18.6	30	15	22.5	18.1	
24-31/10 4	30	19	24.5	20.1	32	15	23.5	19.1	
1 - 7 / 11 1	29	14	21.5	17.1	31	12	21.5	17.1	
8-15/ 11 2	24	15	19.5	15.1	26	12	19	14.6	
16-23/11 3	22	11	16.5	12.1	25	09	17	12.6	
24-30/11 4	21	10	15.5	11.1	23	08	15.5	11.1	
1 - 7 / 12 1	20	11	15.5	11.1	23	08	15.5	11.1	
8-15 / 12 2	18	09	13.5	9.1	20	07	13.5	9.1	
16-23/12 3	19	09	14	9.6	21	06	13.5	9.1	
24-31/12 4	16	09	12.5	8.1	18	06	12	7.6	

RESULTS AND DISCUSSION

Concerning the phenological phases and its extent of some peach cultivars data are presented in Table (1). The obtained results showed an obvious varietal difference of bud burst. In the first location: "Florda Prince" cultivars was the earliest one in this respect. While "Florda Gold" cultivar ranked last. In the second location: "Early Grand" cultivar was the earliest one in this respect and "Florda Gold" cultivar was the last one. So, it is concluded that, the first location was earlier in this respect.

The beginning of flowering for different cultivars in the two locations varied from year to year. In 2004 season "Florda Prince" and "Early Grand" cultivars were as the same in (27/1) and "Florda Gold" was latest one (12/2), but in 2005 season "Early Grand" cultivar was the earliest, January 25th, while "Florda Gold" cultivar was the latest one, February 13th. These results recorded in the first location. While in the second location, "Early Grand" cultivar was earlier by 17 – 18 days than the latest one "Florda Gold" cultivar in 2004 and 2005 seasons respectively. Thus, the second location was later than the first location in this respect. Concerning date of fruit set, the obtained data showed that, "Early Grand" cultivar was the earliest one in this respect (February 19th, February 15th) during 2004 and 2005 seasons respectively, in the first location and (February 25th, February 26th) in the second location. While the latest one was "Florda Gold" (6th, 4th March) in the first location during 2004 and 2005 seasons respectively, but in the second location, the latest one was "Florda Gold" cultivar (March 11th) during both seasons of study. Generally speaking, the first location was earlier than the second location in this respect.

In the first location, "Florda Prince" cultivar had the earliest harvest date (April 29th – April 25th) and the latest one in this respect was "Florda Gold" cultivar (18th – 21st May) during 2004 and 2005 seasons respectively. While, the second location, "Florda Prince" and "Early Grand" cultivars were similar in this aspect (8th, 6th May and May 7th), but "Florda Gold" cultivar had harvest date (May 25th and May 29th) in 2004 and 2005 seasons respectively. Data also, indicated that, peaches in the first location were earlier in maturity.

Table (1): Dates of phenological phases for some Peach cultivars in both locations during 2004 &2005 seasons.

Locations	Cultivars	El-wahat El-Baharaia			El-badrashin		
		Florda Prince	Florda Gold	Early Grand	Florda Prince	Florda Gold	Early Grand
Bud burst	2004	2/1	15/1	3/1	6/1	19/1	5/1
	2005	3/1	14/1	4/1	8/1	20/1	6/1
Beginning of Flowering	2004	27/1	12/2	27/1	2/2	18/2	1/2
	2005	30/1	13/2	25/1	3/2	20/2	2/2
Full Bloom	2004	11/2	25/2	10/2	17/2	2/3	16/2
	2005	13/2	24/2	7/2	18/2	1/3	17/2
Fruit Set	2004	20/2	6/3	19/2	26/2	11/3	25/2
	2005	22/2	4/3	15/2	27/2	11/3	26/2
Harvesting Yield	2004	29/4	18/5	1/5	8/5	25/5	6/5
	2005	25/4	21/5	30/4	7/5	29/5	7/5

Growing degree days (G.D.D.) needed for various phenomena were studied in 2004 and 2005 seasons using base temperature (4.4°C). Data in Table (2) indicated that the period from bud burst to beginning of flowering was 294.3 and 301.6 G.D.D. in "Florda Gold" cultivar, and 227.4 and 251.4 G.D.D. in "Florda Prince", while "Early Grand" was the lowest one (217.8 and 185.2 G.D.D.) in both studied seasons respectively. These results in the first location, while in the second location, "Florda Gold" cultivar needed 321.8 and 333.2 G.D.D. in both studied seasons respectively. Also, "Early Grand" was the lowest one (248.5 G.D.D.) in 2004 season and "Florda Prince" the lowest one (212.4 G.D.D.) in 2005 season.

The period from beginning of flowering to fruit set needed in the first location, was 256.9 and 262.3 G.D.D. in "Florda Gold", followed by "Florda Prince" (250.4 and 237.3 G.D.D.) and "Early Grand" had the lowest one (241.3 and 222.2 G.D.D.) in both study seasons respectively. So, in the second location, this period needed 316.4 and 299.8 G.D.D. in "Florda Gold", while "Early Grand" had the lowest one (278.3 G.D.D.) in 2004 season. But in 2005 season "Florda Prince" cultivar was the lowest one (255.3 G.D.D.) in this respect. While, the period from fruit set to harvesting needed 1083.8 and 1016.4 G.D.D. (in the first location) & 1159.5 and 1328.1 G.D.D. (in the second location) in "Florda Gold", "Florda Prince" needed 1028.4 and 912.3 G.D.D. (in the first location) & 1191.2 and 1079.1 G.D.D. (in the second location), but "Early Grand" needed 1065.6 and 1130.9 G.D.D. (in the first location) & 1147.5 and 1091.7 G.D.D. (in the second location) during both seasons respectively. On the other hand the period from leaf fall to bud burst needed 427.2 and 621.0 G.D.D. (in the first location) & 428.7 and 389.6 G.D.D. (in the second location) in "Florda Gold", followed that "Florda Prince" (419.0 and 397.1 G.D.D. in the first location & 372.9 and 350.9 G.D.D. in the second location), while "Early Grand" was the lowest one (368.1 and 395.1 G.D.D. in the first location & 290.7 and 346.8 G.D.D. in the second location) during both seasons respectively.

Table (2): Growing degree days of some Peach cultivars in both locations during 2004 and 2005 seasons.

Locations	Cultivars	El-wahat El-Baharaia			El-badrasahin		
		Florda Prince	Florda Gold	Early Grand	Florda Prince	Florda Gold	Early Grand
From bud burst to beginning of flowering	2004	227.4	294.3	217.8	250.0	321.8	248.5
	2005	251.4	301.6	185.2	212.4	333.2	244.8
From beginning of flowering to fruit set	2004	250.4	256.9	241.3	279.3	316.4	278.3
	2005	237.3	262.3	222.2	255.3	299.8	275.0
From fruit set to harvesting	2004	1028.4	1083.8	1065.6	1191.2	1159.5	1147.5
	2005	912.3	1016.4	1130.9	1079.1	1328.1	1091.7
From bud burst to harvesting	2004	1506.2	1635.0	1524.7	1720.5	1797.7	1674.3
	2005	1401.0	1580.3	1538.3	1546.8	1961.1	1611.5
From leaf fall to bud burst	2004	419.0	457.2	368.1	372.9	428.7	290.7
	2005	397.1	621.0	395.1	350.9	389.6	346.8

Data in Tables (3 and 4) reported that, in both locations, Bud burst, Flowering, Fruit set and Harvesting in "Florda Gold" required higher G.D.D. than both "Florda Prince" and "Early Grand" cultivars.

Table (3): Growing degree days in the first location of some Peach cultivars during 2004 &2005 seasons.

Cultivars Year Subject	Florda Prince			Florda Gold			Early Grand		
	2004	2005	mean	2004	2005	mean	2004	2005	mean
Bud burst	419.0	397.1	408.1	457.2	621.0	539.1	368.1	395.1	381.6
Flowering	646.4	648.5	647.5	751.5	922.6	837.1	585.9	580.3	583.1
Fruit set	896.8	885.8	891.3	1008.4	1184.9	1096.7	827.2	802.5	814.9
Harvesting	1925.2	1798.1	1861.7	2092.2	2201.3	2146.8	1892.8	1933.4	1913.1

Table (4): Growing degree days in the second location of some Peach cultivars during 2004 &2005 seasons.

Cultivars Year Subject	Florda Prince			Florda Gold			Early Grand		
	2004	2005	mean	2004	2005	mean	2004	2005	mean
Bud burst	372.9	350.9	361.9	428.7	389.6	409.2	290.7	346.8	318.8
Flowering	622.9	563.3	593.1	750.5	722.8	736.7	539.2	591.6	565.4
Fruit set	902.2	818.6	860.4	1066.9	1022.6	1044.8	817.5	866.6	842.1
Harvesting	2093.4	1897.7	1995.6	2226.4	2350.7	2288.6	1965.0	1958.3	1961.7

Generally, in all cultivars both Bud burst and Flowering needed more G.D.D. in the first location than the second location. However in "Florda Prince" and "Florda Gold" cultivars the G.D.D. needed for Fruit set was more in the first location than the second one.

On the other hand, in all cultivars harvesting needed more G.D.D. in the second location than the first location.

Similar findings were observed by Stino, 1991, Nishimoto & Fujisaki, 1995 and El-Agamy *et al*, 2002.

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دراسات على الوحدات الحرارية اليومية اللازمة لنمو وأثمار بعض أصناف الخوخ تحت الظروف المصرية

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أجريت هذه الدراسة على ثلاثة من أصناف الخوخ المستوردة ذات إحتياجات البرودة القليلة وهي فلوريدا برنس وفلوريدا جولد وإيرلي جرانند خلال موسمين متتاليين 2004 و2005 . في مزرعتين مختلفتين في ظرفهما المناخية الأولى في الواحات البحرية أما المزرعة الثانية فهي في البدرشين- جيزة وعمر الأشجار بهما 12 سنة. وكانت أشجار الخوخ المستخدمة في هذه الدراسة مطعومة على أصل نيماجارد ومنزعة على مسافات 5 × 5 متر وقد شملت الدراسة تحديد الوحدات الحرارية اليومية اللازمة لكل من تكشف البراعم والتزهير وعقد الثمار ونضجها لكل صنف على حده وكذا إجراء مقارنة بين أصناف المزرعتين في إحتياجاتهم الحرارية وقد تبين من الدراسة أن هناك اختلافات في الوحدات الحرارية اليومية اللازمة لتكشف البراعم والتزهير وعقد الثمار ونضجها بين الأصناف موضوع الدراسة وكذلك بين المزرعتين حيث تبين أنه في كلا المزرعتين سجل صنف فلوريدا جولد أعلى وحدات حرارية مقارنة بالصنفين الآخرين حيث سجل في:

- تكشف البراعم في المزرعتين (539,1 – 409,2 وحده حراريه) على التوالي.
- التزهير في المزرعتين (837,1 – 736,7 وحده حراريه) على التوالي.
- العقد في المزرعتين (1096,7 – 1044,8 وحده حراريه) على التوالي.
- نضج الثمار (2146,8 – 2288,6 وحده حراريه) على التوالي.

وكان صنف إيرلي جرانند الأقل في الوحدات الحرارية اليومية.

وعموما كانت أصناف المزرعة الأولى أعلى الوحدات الحرارية اليومية من أصناف المزرعة الثانية في كل من تكشف البراعم والتزهير، في حين كان صنف فلوريدا برنس وفلوريدا جولد اعلى في الوحدات الحرارية اليومية اللازمة لعقد الثمار في المزرعة الأولى مقارنة بالمزرعة الثانية، بينما كانت جميع الأصناف في المزرعة الثانية اعلى من المزرعة الأولى في الإحتياجات الحرارية اللازمة لنضج الثمار.