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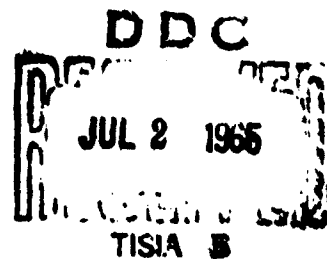
Silver Spring, Maryland

THE USE OF PHENOLOGY IN ASCERTAINING THE TEMPERATURE REQUIREMENTS OF CITRUS FRUIT

(Tabular Material - Part I)

Based on Some Data From A Number of Citrus-Growing Countries

Contract No. DA 18-064-AMC-127(A)



April, 1965

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\* Phenological records and the day-degree summation requirements of the relevant varieties of citrus grown in the various citrus areas of the United States, as well as the comparison of these requirements with those of the same varieties grown in other countries, is to be presented in Part II of this report should the continuation of this investigation be made possible.

TABLE A  
YEAR-ROUND GLOBAL CLIMATIC ANALOGUES OF THE CITRUS AREAS OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	Region of Country	PROVINCE	Latitude	TEMPERATURE						ANNUAL RELATIVE HUMIDITY			PRECIPITATION			
					WARMEST MONTH			COOLEST MONTH			Mean %	Daily Min. %	Annual Amount Inches	Maximum Occurrence			
					Mean °F	Day °F	Night °F	Mean °F	Day °F	Night °F							
					ANNUAL Mean °F	Day °F	Night °F	ANNUAL Mean °F	Day °F	Night °F	ANNUAL Mean %	Daily Min. %	Annual Amount Inches	Maximum Occurrence			
Chico	California	Southern	Bouches du Rhone	39°42'N	61	68	54	79	88	70	44	49	40	71	45	27	Fall-Winter
Aries	France	Northeastern	Evros	43°40'N	58	63	53	76	83	69	42	46	39	n.a.	n.a.	26	Fall-Winter
Alexandroupolis	Greece			40°51'N	60	64	55	78	84	73	42	46	39	69	64	23	Fall-Winter
Willows	California	Northern	Macedonia	39°31'N	62	69	55	79	87	70	45	49	40	71	45	18	Fall-Winter
Thessaloniki	Greece			40°37'N	61	65	57	80	85	75	43	46	40	65	60	19	Fall
Bada Joz	Spain	Southwestern	Extremadura	38°54'N	62	67	56	78	86	71	47	51	43	66	50	17	Winter
Oroville	California	Western	Croatia	39°26'N	62	68	55	80	88	70	45	49	41	71	45	30	Fall-Winter
Split	Yugoslavia			43°31'N	60	64	57	78	82	73	45	48	42	60	56	35	Fall
Colusa	California	Southern	Apulia	39°12'N	62	68	55	78	88	69	45	50	41	71	45	16	Fall-Winter
Foggia	Italy			41°26'N	61	66	56	78	85	72	45	49	41	68	55	18	Fall
Granada	Spain	Southern	Granada	37°09'N	60	65	54	78	84	71	44	49	40	n.a.	n.a.	16	Fall-Winter
Marysville	California	Eastern	Larisa	39°09'N	62	69	56	79	88	70	46	50	42	71	45	21	Fall-Winter
Larisa	Greece			39°38'N	61	66	56	80	87	73	42	46	37	70	59	20	Fall
Be'ja	Tunisia	Northern	Constantine	36°43'N	64	69	59	82	89	74	48	52	45	68	n.a.	25	Winter
Constantine	Algeria	Northern		36°22'N	60	66	55	78	85	71	44	48	41	66	57	20	Winter
Orange Cove	California	Northern	Constantine	36°37'N	62	70	55	80	90	71	45	50	40	60	40	14	Fall-Winter
Tebessa	Algeria			35°24'N	60	66	55	80	88	73	43	47	39	53	41	13	Winter-Spring
Bakersfield	California	Southern		35°25'N	65	72	58	84	93	76	47	52	42	52	36	6	Winter
Cafsa	Tunisia	Western		34°25'N	66	73	60	86	93	78	48	53	44	56	41	6	Winter
Rutbc	Iraq			33°02'N	66	73	59	86	94	78	44	50	39	42	27	4	Fall-Winter
Santa Barbara	California	Central	Santiago	34°26'N	60	66	54	67	73	62	52	58	46	74	60	18	Fall-Winter
Santiago	Chile			33°27'S	58	65	52	69	77	61	48	53	42	66	49	14	Fall-Winter
Westwood (U.C.L.A.)	California	Southern S.A.	South Australia	34°04'N	62	67	58	69	74	64	55	60	51	71	60	18	Fall-Winter
Port Lincoln	Australia			34°43'S	61	65	56	68	73	64	53	57	49	70	62	18	Fall-Winter
Capetown	South Africa	Southern	Cape Province	33°54'S	62	67	57	70	74	65	54	59	49	72	60	20	Fall-Winter
Santa Ana	California	Southern	Farro	33°46'N	62	69	55	72	79	65	52	60	45	71	60	16	Fall-Winter
Lagos	Portugal			37°06'N	63	67	59	74	79	70	54	58	50	66	63	18	Winter
Roseworthy	Australia	Southwestern	South Australia	34°05'S	62	67	56	73	79	65	51	55	46	64	45	17	Fall-Winter
Casablanca	Morocco	Northwestern		33°35'N	64	68	59	74	77	70	54	59	49	78	68	16	Fall-Winter

TABLE A  
 YEAR-ROUND GLOBAL CLIMATIC ANALOGUES OF THE CITRUS AREAS OF THE UNITED STATES  
 (continued)

STATION	COUNTRY (State of U.S.)	Region of Country	PROVINCE	Latitude	T E M P E R A T U R E												ANNUAL RELATIVE HUMIDITY		PRECIPITATION	
					ANNUAL			WARMEST MONTH			COOLEST MONTH			Mean Day °F	Mean Night °F	Daily Min. %	Maximum Occurrence			
					Mean Day °F	Mean Night °F	Mean Night °F	Mean Day °F	Mean Night °F	Mean Day °F	Mean Night °F	Annual Amount Inches								
					Mean Day °F	Mean Night °F	Mean Night °F	Mean Day °F	Mean Night °F	Mean Day °F	Mean Night °F	Annual Amount Inches								
Riverside	California	Western Vic.	Victoria	33°58'N	63	71	55	76	85	66	51	58	44	44	47	12	Fall-Winter			
Swan Hill	Australia	Central N.S.W.	New South Wales	35°22'S	62	68	55	74	82	67	48	53	44	44	44	13	Fall-Winter			
Bairnsdale	Australia	Southeastern	South Australia	34°37'S	63	70	56	76	84	68	50	55	44	44	n.a.	12	Fall-Winter			
Kyancutta	Australia	Southern	South Australia	33°07'S	63	70	55	74	83	65	52	58	46	46	36	13	Winter			
Kalbarriin	Australia	Southern	Western Australia	31°39'S	64	71	58	77	85	70	52	56	47	47	59	14	Fall-Winter			
Mc redin	Australia	Southeastern	Western Australia	31°29'S	64	70	57	77	85	69	50	55	45	45	n.a.	12	Fall-Winter			
Montagu	South Africa	Southern	Cape Province	33°47'S	64	70	57	75	82	68	52	59	46	46	n.a.	12	Fall-Winter			
Berrechid	Morocco	Northwestern		33°18'N	64	71	56	76	85	68	52	58	45	45	48	15	Fall-Winter			
Yuma Citrus Sta.	Arizona			32°37'N	72	80	64	92	99	84	53	60	46	46	19	3	Fall-Winter			
El Golea	Algeria	Central	Sahara	30°35'N	72	78	65	93	100	86	50	57	43	42	29	2	Winter			
Es Sulman	Iraq	Southern		30°28'N	73	81	65	92	101	84	50	57	44	41	31	2	Winter-Spring			
Cadames	Libya	Northwestern	Fezzan	30°08'N	72	80	64	90	100	81	50	57	44	41	28	1	Winter			
Tempe	Arizona			33°26'N	68	76	60	88	96	80	49	57	42	43	27	8	Fall			
Gafsa	Tunisia	Southern		34°25'N	66	73	60	86	93	78	48	53	44	56	41	6	Winter			
Meslaco	Texas			26°09'N	74	80	69	85	90	79	62	67	57	70	n.a.	24	Spring-Summer			
Emerald	Australia	Central Qas.	Queensland	23°28'S	72	78	67	83	89	77	58	65	52	59	39	23	Spring-Summer			
Orlando	Florida	Southeastern Queensland	Queensland	28°33'N	72	76	67	82	86	78	60	66	55	73	51	51	Summer			
Maryborough	Australia			25°32'S	70	75	65	78	83	73	60	66	54	74	n.a.	45	Summer			
Lake Alfred	Florida			28°06'N	72	78	67	82	87	77	62	68	56	73	51	52	Spring-Summer			
Corrientes	Argentina	Northeastern	Corrientes	27°28'S	72	77	66	82	88	76	62	66	57	72	66	46	Spring & Fall			
Asumcion	Paraguay	Southwestern		25°17'S	74	80	68	83	89	77	62	67	58	68	54	52	Spring-Summer			
Fort Pierce	Florida	Southwestern		27°25'N	74	78	70	82	86	78	66	70	62	76	61	54	Summer-Fall			
Itacurubi	Paraguay			24°27'S	74	78	71	83	86	80	64	68	60	73	62	57	Spring-Summer			
Homestead	Florida			25°30'N	74	79	68	81	86	76	66	72	60	76	60	64	Summer-Fall			
Meckay	Australia	Eastern Qas.	Queensland	21°09'S	72	76	69	80	83	77	62	67	57	79	n.a.	63	Summer			

TABLE B  
YEAR-ROUND GLOBAL THERMAL ANALOGUES OF THE CITRUS AREAS OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	Region of Country	PROVINCE	Latitude	T E M P E R A T U R E												ANNUAL RELATIVE HUMIDITY	
					ANNUAL				WARMEST MONTH				COOLEST MONTH				Mean %	Daily Min. %
					Mean °F	Mean Day °F	Mean Night °F	Mean °F	Mean Day °F	Mean Night °F	Mean Day °F	Mean Night °F	Mean Day °F	Mean Night °F	Mean Day °F	Mean Night °F		
																	Mean °F	Mean Day °F
Lemon Cove Ashur-ade Damascus	California U.S.S.R. Syria	Central Asia Southwestern	Turkmen	36°23'N 36°54'N 33°30'N	64 71 64	71 82 70	56 n.a. 57	64 81 82	92 n.a. 90	73 n.a. 73	46 46 44	51 n.a. 49	41 n.a. 40	52 n.a. 48	36 n.a. 36			
Bakersfield Adana	California Turkey	Southern		35°25'N 36°59'N	65 66	72 72	58 60	84 83	93 89	76 77	47 48	52 53	42 43	52 57	36 44			
Santa Barbara Esperance	California Australia	Southern W.A.	Western Australia	34°26'N 33°50'S	60 61	66 64	54 57	67 69	73 74	62 64	52 54	58 58	46 49	74 73	60 64			
Westwood (U.C.L.A.) Jervis Bay Cape Naturaliste Eyre Port Elizabeth D. P. Malan	California Australia Australia Australia South Africa South Africa	Southeastern W.S.W. Southwestern W.A. Southwestern W.A. Southern Southern	New South Wales Western Australia Cape Province Cape Province	34°04'N 35°05'S 33°32'S 32°14'S 33°59'S 33°58'S	62 62 62 62 63 62	67 65 66 67 68 67	58 59 58 57 58 57	69 70 68 70 70 70	74 72 73 75 74 74	64 67 64 65 66 65	55 54 56 54 56 54	60 57 58 53 59 59	51 51 53 48 50 49	71 72 72 66 66 72 n.a.	60 67 66 66 n.a. 63 n.a.			
Santa Ana Montevideo	California Uruguay	Southern		33°46'N 34°52'S	62 61	69 66	55 56	72 72	79 78	65 67	52 50	60 54	45 47	71 72	60 61			
Riverside Rosario Jerusalem	California Argentina Israel	Eastern Eastern	Entre Ríos	33°58'N 32°58'S 31°47'N	63 64 63	71 69 68	55 58 58	76 76 76	85 83 81	66 70 70	51 50 48	58 55 52	44 46 44	61 66 53	47 54 45			
El Cajon Kalamang Belladonia	California Australia Australia	Southwestern W.A. Southern W.A.	Western Australia Western Australia	32°47'N 33°42'S 32°28'S	62 60 63	70 66 70	54 55 56	73 71 73	81 78 80	66 64 65	51 50 52	59 54 58	44 46 46	65 67 61	n.a. 51 43			
Yuma Citrus Station Peshawar	Arizona Pakistan	Northern	West Pakistan	32°37'N 34°01'N	72 72	80 79	64 65	92 92	99 99	84 84	53 52	60 57	46 46	32 50	19 38			
Weslaco La Paz Lungchow	Texas Mexico China	Western Southern	Baja California Kwangsi	26°09'N 24°10'N 22°22'N	74 74 74	80 79 77	69 70 70	85 85 84	90 90 88	79 80 80	62 64 58	67 68 62	57 61 54	70 78 83	n.a. 73 75			
Orlando Port Said Dibrugach Monterrey Taipei	Florida Egypt India Mexico Taiwan	Northern Northeastern Northern	Assam Nuevo Leon	28°33'N 31°16'N 27°28'N 25°40'N 25°02'N	72 71 73 71 72	76 74 77 76 76	67 68 69 66 68	82 82 82 82 84	86 86 84 87 88	78 78 79 77 80	60 58 60 58 59	66 62 66 61 62	55 55 55 54 56	73 66 84 66 80	51 59 76 57 68			

TABLE B  
 YEAR-ROUND GLOBAL THERMAL ANALOGUES OF THE CITRUS AREAS OF THE UNITED STATES  
 (Continued)

STATION	COUNTRY (State of U.S.)	Region of Country	PROVINCE	Latitude	TEMPERATURE						ANNUAL RELATIVE HUMIDITY				
					ANNUAL			WARMEST MONTH			COOLEST MONTH			Mean %	Daily Min. %
					Mean °F	Day °F	Night °F	Mean °F	Day °F	Night °F	Mean °F	Day °F	Night °F		
Lake Alfred	Florida	Central	Okinawa	28°06'N	72	78	67	82	87	77	62	68	56	73	51
Maha	Ryukyus			26°12'N	72	75	69	82	86	80	61	64	58	79	n.a.
Homestead	Florida	Central		25°30'N	74	79	68	81	86	76	66	72	60	76	60
Tethombe	Madagascar	Southern		25°18'S	76	81	70	82	87	77	66	73	59	70	52
Canicaco	Mozambique	Southern		24°20'S	75	81	69	82	87	76	65	72	58	72	n.a.
Hualienkang	Taiwan	Central		23°58'N	74	77	70	82	85	78	64	67	61	80	72
Santoc	Brazil	Southeastern	Sao Paulo	23°56'S	72	76	69	78	82	75	66	70	63	78	72
Mazatlan	Mexico	Western	Sinaloa	23°11'N	74	77	72	82	84	79	66	69	63	76	74

TABLE 1

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS OF GRAPEFRUIT (Marsh Seedless Variety)

Setubal (formerly Palmela), Estremadura Province, Portugal  
 Lat. 38°35'N; Long. 08°53'W; Elev. 23 ft.

Crop Year	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Bloom	Peak of Bloom	Beginning of Ripening	Peak of Bloom to Beginning of Ripening
1948	Mar. 18	Mar. 29	Nov. 20	2,910
1949	Mar. 30-Apr. 11	Apr. 15	Nov. 5	2,915
1951	Apr. 13	Apr. 20	Dec. 3	2,662
1953-54	Apr. 13	Apr. 23	Jan. 23	2,812
1954-55	Apr. 19-Apr. 27	Apr. 19-May. 5	Jan. 3	2,569
1955-56	Mar. 17-Apr. 4	Apr. 6 -Apr. 13	Jan. 7	2,910
1957-58	Apr. 2 -Apr. 10	Apr. 19-Apr. 22	Jan. 2	2,552
1960	Mar. 28	Apr. 3	Dec. 5	2,506
1961-62	Mar. 17	Apr. 4	Mar. 12	3,011
Mean	Apr. 3	Apr. 13	Dec. 26	2,761
Standard Deviation	-----			210
Coefficient of Variation (%)	-----			7.6

Source: Based on data of Estacao de Fruticultura, Setubal (formerly Palmela), Portugal.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Day-degree computations were made on the basis of averages of dates indicated.

TABLE 2

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR GRAPEFRUIT (Marsh Seedless Variety)

Valencia, Spain

Lat. 39°29'N; Long. 0°22'N; Elev. 79 ft.

DATES		SUMMATION OF DAY-DEGREES (°F.)
Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to Beginning of Ripening
Apr. 20	Oct. 20	2,774

Source: Based on data from Estacion Naranjera de Levante, Burjasot, Spain.

<sup>1/</sup> Computed above 55°F. base.

TABLE 3

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR GRAPEFRUIT (Marsh Seedless Variety)

Station Experimentale d'Arboriculture, Boufarik, Algeria

\* Lat. 36°30'N; Long. 3°03'E; Elev. 185 ft.

Crop Year	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958	End of April	Oct. 9	2,882
1959	End of April	Oct. 2	2,895
1960	End of April	Oct. 5	2,874
Mean	April 29	Oct. 8	2,884
Standard Deviation	-----		10
Coefficient of Variation (%)	-----		.3

Source: Based on data of Station Experimentale d'Arboriculture, Boufarik, Algeria.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Computed on basis of average of dates shown.

\* Approximate coordinates.

TABLE 4

1/  
PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR GRAPEFRUIT (Marsh Seedless Variety)

Berri Horticultural Research Station, Berri, South Australia  
 Lat. 34°17'S; Long. 140°38'E; Elev. 215 ft.

Crop Year	DATES *		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1960-61	Oct. 11	Aug. 3	3,334
1961-62	Oct. 5	July 17	3,107
1962-63	Oct. 4	Aug. 12	2,913
1963-64	Oct. 4	June 19	2,863
Mean	Oct. 6	July 23	3,054
Standard Deviation	-----		208
Coefficient of Variation (%)	-----		6.8

Source: Based on data from the Berri Horticultural Research Station, Berri, South Australia.

1/ Computed above 55°F. base.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>	<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
October	April	April	October
November	May	May	November
December	June	June	December
January	July	July	January
February	August	August	February
March	September		

TABLE 5

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR GRAPEFRUIT

Sidney, New South Wales, Australia  
 Lat. 33°52'S; Long. 151°12'E; Elev. 138 ft.

Variety	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Marsh Seedless	Oct. 1	Jul. 1	2,966

Source: Based on data from the Department of Agriculture, Sidney, New South Wales, Australia.

1/ Computed above 55°F. base.

2/ Maturity expressed in terms of mls N/10 Sodium hydroxide required to neutralize 10 mls. juice as applied in N.S.W. However, no standard is prescribed for Grapefruit.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
October-----	April-----
November-----	May-----
December-----	June-----
January-----	July-----
February-----	August-----
March-----	September-----
April-----	October-----
May-----	November-----
June-----	December-----
July-----	January-----

TABLE 6

1/  
 AVERAGE PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR GRAPEFRUIT (Marsh Seedless Variety)

Citrusdal, Western Cape Province, South Africa  
 Lat. 32°35'S; Long. 19°01'E; Elev. 494 ft.

	<u>DATES</u> <u>2/</u>	SUMMATION OF DAY-DEGREES (°F.)
Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to Beginning of Ripening
2nd week in Sept.	Apr. 15	3,170

Source: Based on data from South African Co-operative Citrus Exchange, Limited, Pretoria, South Africa.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>	<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
September	March	January	July
October	April	February	August
November	May	March	September
December	June	April	October

TABLE 7

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS OF ORANGES (Washington Navel Variety)

Setubal (formerly Palmela), Estremadura Province, Portugal  
 Lat. 38° 35' N; Long. 08° 53' W; Elev. 116 ft.

Crop Year	Beginning of Bloom	Peak of Bloom	Beginning of Ripening	SUMMATION OF DAY-DEGREES (°F.)			
				Beginning of Ripening (A)	Beginning of Bloom to Beginning of Ripening (B)	Beginning of Bloom to Beginning of Ripening (A)	Peak of Bloom to Beginning of Ripening (B)
1948-49	Mar. 22	Apr. 5	Jan. 6	4,434	2,994	4,292	2,922
1949-50	Apr. 6	Apr. 12	Feb. 15	4,252	2,984	4,168	2,930
1953	Mar. 30	Apr. 10	Dec. 15	4,120	2,848	4,038	2,821
1954	Apr. 19-Apr. 23	Apr. 30-May 5	Nov. 24	3,630	2,545	3,536	2,506
1955	Mar. 25-Apr. 1	Apr. 6 -Apr. 12	Dec. 3	4,146	2,904	4,038	2,848
1957	Apr. 4	Apr. 22	Dec. 23	3,765	2,560	3,603	2,488
1961	Mar. 26	Apr. 10	Nov. 13	4,088	2,928	3,962	2,877
Mean	Apr. 2	Apr. 14	Dec. 19	4,062	2,823	3,948	2,770
Standard Deviation	-----			261	194	271	196
Coefficient of Variation (%)	-----			6.4	6.9	6.9	7.1

Source: Based on data of Estacao de Fruticultura, Setubal (formerly Palmela), Portugal.

<sup>1/</sup> Column A - computed above 50°F. base.

Column B - computed above 55°F. base.

<sup>2/</sup> Day-degree computations were made on the basis of averages of dates indicated.

TABLE 8

1/  
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR ORANGES

Station Experimentale d'Arboriculture, Boufarik, Algeria  
\* Lat. 36°30'N; Long. 3°03'E; Elev. 185 ft.

CROP YEAR	DATES 2/		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958	End of April	Oct. 14	2,932
1959	End of April	Oct. 9	2,972
1960	End of April	Oct. 5	2,874
Mean -----	April 29	Oct. 9	2,925
Standard Deviation -----			43
Coefficient of Variation (%) -----			1.5
<b>VALENCIA LATE</b>			
CROP YEAR	DATES 2/		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958	1st week in May	Nov. 19	3,103
1959	1st week in May	Nov. 19	3,258
1960	1st week in May	Nov. 29	3,242
Mean -----	May 4	Nov. 22	3,201
Standard Deviation -----			82
Coefficient of variation (%) -----			2.6

Source: Based on data of Station Experimentale d'Arboriculture, Boufarik, Algeria.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

\* Approximate coordinates.

TABLE 9

<sup>1/</sup>PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR ORANGES (Washington Navel Variety)

Murrumbidgee Irrigation Area, Griffith, N.S.W., Australia  
 Lat. 34°17'S; Long. 146°03'E; Elev. 429 ft.

Crop Year	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming *	Beginning of Ripening *	
1961-62	Oct. 5	June 15	3,131
1962-63	Oct. 5	June 15	2,854
1963-64	Oct. 8	June 15	2,773
Mean -----	Oct. 6	June 15	2,919
Standard Deviation -----			177
Coefficient of Variation (%) -----			6.1

Source: Based on data of Murrumbidgee Irrigation Area, Griffith, N.S.W., Australia

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Computed on basis of average of dates shown.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>	<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
October -----	April	March -----	September
November -----	May	April -----	October
December -----	June	May -----	November
January -----	July	June -----	December
February -----	August		

TABLE 10

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES

Sao Paulo Citrus District, Campinas, Brazil  
 \*Lat. 22°50'S; Long. 47°15'W; Elev. 2,000 ft.

Variety	** DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Washington Navel	Aug.	Mar. - July	2,609

Source: Based on data of USDA Foreign Agricultural Report No. 109, June 1958. Temperature data used are for Sao Paulo, Brazil (Approximate Lat. 23°S; Long. 46°W).

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> To compute day-degrees from beginning of bloom to beginning of ripening, an average date was used of the first month shown for each period.

\* Approximate coordinates.

\*\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
August-----	February
September-----	March
October-----	April
November-----	May
December-----	June
January-----	July
February-----	August
March-----	September
April-----	October
May-----	November
June-----	December
July-----	January

TABLE 11

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES

Urundel and Tabacal Citrus Areas, Argentina  
 \*Lat. 22°40'S; Long. 64°W; Elev. 2,000-3,000 ft.

Variety	** DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Valencia	August	Aug. - Dec.	3,238
Washington Navel	August	Mar. 15 - Apr. 15	2,622

TABLE 12

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES

Ledesma and Calilegua Citrus Areas, Argentina  
 \*Lat. 23°50'S; Long. 64°50'W; Elev. 2,000-3,000 ft.

Variety	** DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Valencia	August	Aug. - Dec.	3,238
Washington Navel	August	Mar. 15 - Apr.	2,622

Source: Based on data of USDA Foreign Agriculture Report No. 114, January 1959. Temperature data used are those of Salta (Lat. 24°32'S; Long. 66°14'W; Elev. 3,865 ft), Argentina.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> To compute day-degrees from beginning of bloom to beginning of ripening, an average date was used for the first month shown of each period.

\*\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>	<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
August-----	February	January-----	July
September-----	March	February-----	August
October-----	April	March-----	September
November-----	May	April-----	October
December-----	June		

\* Approximate coordinates.

TABLE 13

PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES (Washington Navel Variety)

Berri Horticultural Research Station, Berri, South Australia  
 Lat. 34°17'S; Long. 140°38'E; Elev. 215 ft.

Crop Year	DATES *		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958-59	Oct. 3	June 17	3,253
1959-60	Sept. 11	May 26	3,104
1960-61	Sept. 23	June 6	3,432
1961-62	Sept. 29	June 9	3,161
1962-63	Sept. 18	May 23	2,929
Mean -----	Sept. 23	June 4	3,176
Standard Deviation -----			167
Coefficient of Variation (%) -----			5.3

Source: Based on data from the Berri Horticultural Research Station, Berri, South Australia.

<sup>1/</sup> Computed above 55°F. base.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

Southern Hemisphere	Northern Hemisphere	Southern Hemisphere	Northern Hemisphere
October -----	April	April -----	October
November -----	May	May -----	November
December -----	June	June -----	December
January -----	July	July -----	January
February -----	August	August -----	February
March -----	September	September -----	March

TABLE 14

1/ PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR ORANGES (Valencia Late Variety)

Murrumbidgee Irrigation Area, Griffith, N.S.W., Australia  
 Lat. 34°17'S; Long. 146°03'E; Elev. 429 ft.

Crop Year	DATES <u>2/</u>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming *	Beginning of Ripening *	
1961-62	Oct. 7	Sept.	3,105
1962-63	Oct. 7	Sept.	2,844
Mean -----	Oct. 7	Sept. 15	2,974

Source: Based on data of Murrumbidgee Irrigation Area, Griffith, N.S.W., Australia

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>	<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
October -----	April -----	April -----	October -----
November -----	May -----	May -----	November -----
December -----	June -----	June -----	December -----
January -----	July -----	July -----	January -----
February -----	August -----	August -----	February -----
March -----	September -----	September -----	March -----

TABLE 15

PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES (Valencia Variety)

Berri Horticultural Research Station, Berri, South Australia  
 Lat. 34° 17' S; Long. 140° 38' E; Elev. 215 ft.

Crop Year	DATES *		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1957-58	Oct. 2	Sept. 17	3,199
1958-59	Oct. 10	Oct. 2	3,332
1959-60	Sept. 14	Sept. 13	3,107
1960-61	Sept. 30	Sept. 11	3,475
1961-62	Sept. 29	Oct. 15	3,289
1962-63	Sept. 18	Oct. 19	3,247
Mean	-----Sept. 27	Sept. 28	3,275
Standard Deviation	-----	-----	113
Coefficient of Variation (%)	-----	-----	3.5

Source: Based on data from the Berri Horticultural Research Station, Berri, South Australia.

<sup>1/</sup> Computed above 55°F. base.

\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

Southern Hemisphere	Northern Hemisphere	Southern Hemisphere	Northern Hemisphere
October	April	April	October
November	May	May	November
December	June	June	December
January	July	July	January
February	August	August	February
March	September	September	March

TABLE 16

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES

Taranto, Italy  
 Lat. 40°28'N; Long. 17°17'E; Elev. 56 ft.

Variety	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Washington Navel	1st days of May	Dec. 15	3,469

Source: Based on data from Taranto Experiment Station, Taranto, Italy.

<sup>1/</sup> Computed above 55°F. base.  
<sup>2/</sup> Computed on basis of average of dates shown.

TABLE 17

<sup>1/</sup> PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR ORANGES (Washington Navel Variety)

Mallia, Island of Crete, Greece  
 Lat. 35°18'N; Long. 25°30'E; Elev. 66 ft.

Year	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1960	Apr. 5	Oct. 15	3,724
1961	Apr. 6	Oct. 18	3,625
1962	Apr. 5	Oct. 10	3,572
1963	Apr. 5	Oct. 12	3,727
Mean	----- Apr. 5	Oct. 14	3,662
Standard Deviation	-----	-----	80
Coefficient of Variation (%)	-----	-----	2.2

Source: Based on phenological data of Experimental Orchard, Mallia, Iraklion District, Island of Crete, Greece. Temperature data used are those of Candia (Lat. 35°20'N; Long. 25°11'E; Elev. 151 ft.), Island of Crete.

<sup>1/</sup> Computed above 55°F. base.

TABLE 18

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR ORANGES (Washington Navel Variety)

Sidi Mesri Experiment Station, Tripoli, Libya  
 Lat. 32°54'N; Long. 13°11'E; Elev. 72 ft.

Crop Year	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1961	Mar. 15	Nov. 20	3,838
1962	Mar. 10	Nov. 15	3,987
1963	Mar. 17	Nov. 22	3,828
Mean -----	Mar. 14	Nov. 19	3,884
Standard Deviation -----			86
Coefficient of Variation (%) -----			2.2

Source: Based on data of Sidi Mesri Experiment Station, Tripoli, Libya.

<sup>1/</sup> Computed above 55°F. base.

TABLE 19

1/  
AVERAGE PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR ORANGES

Messina, Sicily, Italy  
Lat. 38°12'N; Long. 15°33'E; Elev. 167 ft.

Variety	DATES <u>2/</u>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to	Beginning of Ripening
Valencia	Middle of March	end April - early May		3,991
Washington Navel	Middle of March	November		3,674

Source: Based on data from Messina Experiment Station, Messina, Sicily, Italy.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

TABLE 20

1/  
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR ORANGES

Rehovot, Coastal Plain, Israel  
Lat. 31°54'N; Long. 34°49'E; Elev. 214 ft.

VALENCIA VARIETY	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening <u>2/</u>	
1952	Apr. 1	Mar. 1 - 10	4,797
1953	Apr. 13	Mar. 1 - 10	4,159
1954	Mar. 16	Mar. 1 - 10	4,430
Mean -----	Mar. 31	Mar. 5	4,462
Standard Deviation -----			280
Coefficient of Variation (%) -----			6.3

WASHINGTON NAVEL VARIETY	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1954	Mar. 10	Oct. 31	3,892
1955	Mar. 5	Nov. 1	3,994
Mean -----	Mar. 6	Oct. 31	3,943

Source: Based on data from the Volcani Institute of Agricultural Research, The National and University Institute of Agriculture, Rehovot, Israel. Temperature data used are from Lod (Lat. 31°59'N; Long. 34°54'E; Elev. 132 ft.), Israel.

1/ Computed above 55°F. base.

2/ Oct. 15 was given as average date of beginning of picking.

TABLE 21

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS OF TANGERINES (Dancy Variety)

Setubal (formerly Palmela), Estremadura Province, Portugal  
 Lat. 38°35'N; Long. 08°53'W; Elev. 116 ft.

Crop Year	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Bloom	Peak of Bloom	Beginning of Ripening	Peak of Bloom to Beginning of Ripening
1948	Mar. 22	Apr. 5	Dec. 13	2,975
1949-50	Apr. 8	Apr. 12	Jan. 6	2,966
1951	Apr. 13- Apr. 20	Apr. 20 - Apr. 27	Jan. 14	2,647
1953	Apr. 13	Apr. 20	Dec. 16	2,812
1954-55	Apr. 1- Apr. 26	May 3 - May 5	Jan. 3	2,599
1955	Apr. 8- Apr. 12	Apr. 16 - Apr. 20	Nov. 17	2,799
1957	Apr. 15	Apr. 26	Dec. 14	2,516
1961	Mar. 28	Apr. 10	Dec. 5	2,956
Mean	Apr. 8	Apr. 19	Dec. 19	2,784
Standard Deviation	-----			184
Coefficient of Variation (%)	-----			6.6

Source: Based on data of Estacao de Fruticultura, Setubal (formerly Palmela), Portugal.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Day-degree computations were made on the basis of averages of dates indicated.

TABLE 22

1/  
PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR TANGERINES (Clementine Variety)

Station Experimentale d'Agrumiculture, San-Giuliano, Corsica, France  
Lat. 46°N; Long. 7°E; Elev. 155 ft.

Year	DATES <u>2/</u>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to Beginning of Ripening	
1963	Apr. 20-May 1	Oct. 30		2,847

Source: Based on data of Station Experimentale d'Agrumiculture, San-Giuliano, Corsica.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

TABLE 23

1/  
 AVERAGE PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR TANGERINES (Clementine, Algerian Variety)

Valencia, Spain  
 Lat. 39°29'N; Long. 0°22'W; Elev. 79 ft.

DATES		SUMMATION OF DAY-DEGREES (°F.)
Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to Beginning of Ripening
Apr. 20	Nov. 15	2,936

Source: Based on data from Estacion Naranjera de Levante, Burjasot, Spain.

1/ Computed above 55°F. base.

TABLE 24

1/  
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR TANGERINES

Station Experimentale d'Arboriculture, Boufarik, Algeria  
\* Lat. 36°30'N; Long. 3°03'E; Elev. 185 ft.

CLEMENTINE VARIETY	DATES 2/		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958	Apr. 15 - 25	Sept. 23	2,682
1959	Apr. 15 - 25	Oct. 1	2,908
1960	Apr. 15 - 25	Sept. 30	2,850
Mean -----	Apr. 20	Sept. 28	2,813
Standard Deviation -----			110
Coefficient of Variation (%) -----			3.9

DANCY VARIETY	DATES 2/		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1958	Apr. 20 - 30	Nov. 10	3,148
1959	Apr. 20 - 30	Nov. 5	3,250
1960	Apr. 20 - 30	Nov. 10	3,222
Mean -----	Apr. 25	Nov. 12	3,207
Standard Deviation -----			49
Coefficient of Variation (%) -----			1.5

Source: Based on data of Station Experimentale d'Arboriculture, Boufarik, Algeria.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown

\* Approximate coordinates.

TABLE 25

AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR TANGERINES

Taranto, Italy

Lat. 40°28'N; Long. 17°17'E; Elev. 56 ft.

Variety	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to	Beginning of Ripening
Clementine	1st days of May	Oct. 24 - 25		3,332

Source: Based on data from Taranto Experiment Station, Taranto, Italy.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Computed on basis of average of dates shown.

TABLE 26

AVERAGE PHENOLOGY, AND DAY-DEGREE <sup>1/</sup> SUMMATIONS FOR TANGERINES

Stazione Sperimentale Di Agrumicoltura E Fruticoltura, Acireale (Catania)  
 Catania, Sicily, Italy  
 Lat. 37°30'N; Long. 2°36'E; Elev. 215 ft.

Variety	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to	Beginning of Ripening
Clementine	Middle of March	end Oct. - early Nov.		3,431

Source: Based on data from Stazione Sperimentale Di Agrumicoltura E Fruticoltura Acireale (Catania), Catania, Sicily, Italy. Temperature data used are for Siracuse (Lat. 37°03'N; Long. 15°18'E; Elev. 76 ft.), Sicily.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Computed on basis of average of dates shown.

TABLE 27

AVERAGE PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR TANGERINES <sup>1/</sup>

Messina, Sicily, Italy  
 Lat. 38°12'N; Long. 15°33'E; Elev. 167 ft.

Variety	DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Clementine	Middle of March	end October - early November	3,569

Source: Based on data from Messina Experiment Station, Messina, Sicily, Italy.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Computed on basis of average of dates shown.

TABLE 28

PHENOLOGY AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR TANGERINES (Clementine Variety)

Rehovot, Coastal Plain, Israel  
 Lat. 31°54'N; Long. 34°49'E; Elev. 214 ft.

Crop Year	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening <sup>2/</sup>	
1952	Apr. 1	Oct. 17	3,876
1953	Apr. 10	Oct. 15	3,627
1954	Mar. 15	Oct. 15	3,595
1955	Mar. 10	Oct. 15	3,685
Mean -----	Mar. 25	Oct. 16	3,696
Standard Deviation -----			113
Coefficient of Variation (%) -----			3.1

Source: Based on data from the Volcani Institute of Agricultural Research, The National and University Institute of Agriculture, Rehovot, Israel. Temperature data used are from Lod (Lat. 31°59'N; Long. 34°54'E; Elev. 132 ft.), Israel.

<sup>1/</sup> Computed above 55°F. base.

<sup>2/</sup> Oct. 15 was given as average date of beginning of picking.

TABLE 29

1/  
AVERAGE PHENOLOGY, AND DAY-DEGREE SUMMATIONS FOR TANGERINES

\* Tunis, Tunisia  
Lat. 36°47'N; Long. 10°12'E; Elev. 66 ft.

Variety	DATES <u>2/</u>		SUMMATION OF DAY-DEGREES (°F.)	
	Beginning of Blooming	Beginning of Ripening	Beginning of Blooming to Beginning of Ripening	Beginning of Ripening
Clementine	Beginning of March	Beginning of November		3,656
Dancy	Middle of March	February - March		3,781

Source: Based on data from Laboratoire d'Arboriculture Fruitiere (INRAT), Tunisia.

1/ Computed above 55°F. base.

2/ Computed on basis of average of dates shown.

\* Citrus area is northwest and southeast of City of Tunis.

TABLE 30

1/ PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR TANGERINES (Clementine Variety)

Sidi Mesri Experiment Station, Tripoli, Libya  
 Lat. 32°54'N; Long 13°11'E; 72 ft. Elev.

Crop Year	DATES		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
1961	Feb. 25	Nov. 10	3,742
1962	Mar. 2	Nov. 15	4,027
1963	Mar. 10	Nov. 10	3,720
Mean -----	Mar. 3	Nov. 12	3,830
Standard Deviation -----			165
Coefficient of Variation (%) -----			4.3

Source: Based on data of Sidi Mesri Experiment Station, Tripoli, Libya.

1/ Computed above 55°F. base.

TABLE 31  
 AVERAGE PHENOLOGY, AND DAY-DEGREE<sup>1/</sup> SUMMATIONS FOR TANGERINES

Concordia Citrus Area, Argentina  
 \*Lat. 31°S; Long. 57°W.

Variety	** DATES <sup>2/</sup>		SUMMATION OF DAY-DEGREES (°F.)
	Beginning of Blooming	Beginning of Ripening	
Dancy	Aug. - Sept.	June - Aug.	3,996

Source: Based on data of USDA Foreign Agriculture Report No. 114, January 1959. Temperature data used are for Salto (Lat. 31°23'S; Long. 57°58'W; Elev. 151 ft.), Uruguay. Salto, Uruguay is located on opposite side of Uruguay River with same latitude.

<sup>1/</sup> Computed above 55°F. base

<sup>2/</sup> To compute day-degrees from beginning of bloom to beginning of ripening an average date was used for the first month shown for each period.

\* Approximate coordinates.

\*\* The pertinent counterpart calendar months in the Southern and Northern Hemispheres are as follows:

<u>Southern Hemisphere</u>	<u>Northern Hemisphere</u>
June-----	December
July-----	January
August-----	February
September-----	March
October-----	April
November-----	May
December-----	June

TABLE 32

## MEAN MONTHLY TEMPERATURE DATA \*

Setubal, Portugal

Crop Year	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1948-49	61	58	61	70	72	73	72	67	62	56	53	56
1949-50	57	64	62	70	73	79	68	65	58	51	50	53
1950-51	55	59	61	67	72	70	69	64	59	50	51	49
1951-52	56	60	63	69	71	73	70	65	58	52	51	53
1952-53	57	58	63	69	71	71	67	62	56	53	50	51
1953-54	55	58	67	68	73	75	71	63	58	53	48	50
1954-55	53	58	64	66	72	70	70	67	59	52	56	53
1955-56	54	62	66	69	71	72	72	65	58	55	51	45
1956-57	54	58	65	69	71	71	66	65	53	47	46	53
1957-58	58	59	63	66	74	72	71	63	56	48	51	54
1958-59	55	58	63	67	72	71	69	65	56	54	53	49
1959-60	54	58	62	68	71	71	68	62	55	52	49	52
1960-61	54	61	64	70	72	70	69	60	56	51	50	54
1961-62	59	58	67	71	74	77	70	62	57	54	51	52

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

1/ Normals

TABLE 33

## MEAN MONTHLY TEMPERATURE DATA - NORMALS\*

Taranto, Italy

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
49	50	52	54	67	75	80	80	74	66	57	51

\* Temperature data utilized in conjunction with citrus phenology records.

TABLE 34

## MEAN MONTHLY TEMPERATURE DATA - NORMALS \*

Spain

Locality	Mar.	Apr.	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Valencia	56	59	64	71	75	76	72	65	58	52	51	52
Malaga	59	61	67	73	77	78	74	67	60	56	54	55
Murcia	59	61	68	74	79	80	76	67	59	54	53	54
Universidad	58	63	68	77	82	82	77	68	59	53	51	54
Badajoz	55	59	64	73	78	78	73	64	55	48	47	50

\* Temperature data utilized in conjunction with citrus phenology records.

TABLE 35

## MEAN MONTHLY TEMPERATURE DATA - NORMALS\*

San-Giuliano, Corsica, France

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
48	49	52	58	63	71	76	77	72	64	56	50

\* Temperature data utilized in conjunction with citrus phenology records.

TABLE 36

## MEAN MONTHLY TEMPERATURE DATA FOR AUSTRALIA \*

Berri, South Australia

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1957-58	56	63	68	74	74	74	69	64	60	49	50	53
1958-59	55	62	70	69	82	74	72	64	55	52	50	56
1959-60	58	62	72	68	77	71	73	62	54	50	50	51
1960-61	56	64	64	77	80	75	71	65	57	54	51	52
1961-62	60	66	68	74	76	73	71	61	54	52	50	51
1962-63	56	62	68	73	73	73	70	61	57	53	50	52
1963-64	59	65	68	73	72	71	68	62	56	52	--	--

Griffith, N.S.W., Australia

Crop Year	Oct..	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1961-62	68	70	74	75	72	70	61	52	52	48	50	55
1962-63	60	67	72	74	73	72	60	57	49	46	50	55
1963-64	63	67	73	71	72	69	63	52	49	--	--	--

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 37

## MEAN MONTHLY TEMPERATURE DATA - NORMALS \*

d'Azaguie, Ivory Coast  
Africa

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
79	84	81	81	80	78	78	78	76	78	80	80	80

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

## MEAN MONTHLY TEMPERATURE DATA \*

Boufarik, Algeria  
Africa

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1958	51	51	59	61	64	71	78	79	76	65	57	56
1959	51	56	58	58	65	74	76	79	75	66	59	55
1960 - (Normals)	49	52	56	60	65	72	77	78	75	66	59	54

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 38

## MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1961- 1963 \*

Sidi Mesri, Tripoli, Libya

Year	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
1961	54	52	56	65	70	73	77	76	73	69	66	57
1962	55	54	60	65	70	72	78	76	76	71	63	54
1963	55	56	55	62	64	75	79	79	78	67	64	61

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 39

MEAN MONTHLY TEMPERATURE DATA - NORMALS \*

Loudima, Congo Brazzaville

Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
83	82	82	82	82	82	80	76	75	76	80	82

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

MEAN MONTHLY TEMPERATURE DATA - NORMALS \*

Citrusdal, Western Cape Province, South Africa

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
75	74	72	65	58	54	54	54	58	63	69	75

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 40

## MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1960 - 1963 \*

Candia, Island of Crete, Greece

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1960	55	59	57	62	70	76	80	81	75	74	66	60
1961	55	53	58	65	71	76	79	79	73	68	68	61
1962	57	54	61	64	71	77	80	76	76	69	68	58
1963	58	58	57	63	68	78	80	82	77	69	64	61

Messara District, Island of Crete, Greece

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1960	53	55	57	62	72	78	83	86	76	74	65	59
1961	53	51	57	64	71	78	84	83	75	67	57	57
1962	54	51	58	62	71	80	84	84	78	68	65	55
1963	53	54	54	61	68	78	85	86	78	69	62	57

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 41

## MEAN MONTHLY TEMPERATURE DATA FOR ARGENTINA \*

## Bella Vista, Argentina

Crop Year <sup>1/</sup>	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1960-61	63	68	71	76	80	82	82	79	72	66	62	62
1960-62	63	66	71	76	80	79	78	76	57	58	59	51
1962-63	59	66	67	77	86	81	79	78	76	65	61	64
1963	63	66	69	71	76	--	--	--	--	--	--	--

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

<sup>1/</sup> Normals for years 1960 and 1961.

## MEAN MONTHLY TEMPERATURE DATA - NORMALS\*

## Argentina

Locality	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Salta	56	63	66	69	70	71	71	69	64	58	55	54
Santiago del Estero	60	68	73	78	80	83	81	77	70	63	56	57
Corrientes	63	68	71	76	80	82	82	79	72	66	62	62
Buenos Aires	52	55	60	66	72	74	73	70	62	56	49	50
Posadas	64	66	70	74	78	79	78	76	69	65	62	60

\* Temperature data utilized in conjunction with citrus phenology records.

TABLE 42

## MEAN MONTHLY TEMPERATURE DATA FOR 1952 - 1955 \*

Lod, Israel

Crop Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1952	55	58	58	64	70	75	77	80	81	74	65	63
1953	55	58	56	62	69	75	80	80	76	74	62	54
1954	54	55	60	60	69	74	78	80	76	72	66	57
1955	56	59	59	64	68	76	78	78	76	72	65	58

## MEAN MONTHLY TEMPERATURE DATA - NORMALS \*

Kibbutz Ha'chorshim, Israel

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
60	57	61	67	73	77	80	82	79	77	69	63

\* Temperature data utilized in conjunction with citrus phenology records covering the same period of years.

TABLE 43

## MEAN MONTHLY TEMPERATURE DATA - NORMALS\*

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Siracuse, Sicily, Italy	51	52	55	60	66	72	78	79	74	68	60	54
Messina, Sicily, Italy	53	54	56	60	66	72	79	80	76	68	62	56
Tunis, Tunisia	50	52	56	60	66	74	79	80	76	68	60	52

\* Temperature data utilized in conjunction with citrus phenology records.

TABLE 44

## MEAN MONTHLY TEMPERATURE DATA - NORMALS\*

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Sidney, N.S.W., Australia	72	72	70	64	59	54	53	56	59	64	67	70
Sao Paulo, Brazil	71	71	70	66	62	60	58	61	63	65	67	69
Salto, Uruguay	79	77	73	65	60	55	54	57	60	65	71	76

\* Temperature data utilized in conjunction with citrus phenology records.