Heat and Chilling Requirements for Plum Blossoming in Mississippi*

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A large number of plum varieties have been grown in the orchards of Mississippi State University at State College, Mississippi, as part of a breeding and variety testing program. The length of the blossoming season, from the earliest to latest, has varied considerably from year to year.

Blossoming dates are important to the fruit grower because many varieties require cross-pollination for good fruit production. Dates of full bloom for 37 varieties from 1957 to 1961 have been included in this study.

In 1957 the earliest blossoming variety reached full bloom on March 1, and the latest blossoming variety reached full bloom on April 23. This blossoming period was over seven weeks long. The length of this total blossoming period for all varieties was longer than average because of prolonged dormancy. The December-January mean temperature (average of daily highs and lows) was 51.5° F. This indicated a very mild winter for this locality. A December-January mean temperature of 48.3° F. represents approximately 950 chilling hours at 45° F. or lower. The rest period of many varieties of fruit trees would be broken by this amount of exposure to these temperatures.

Many varieties of peaches and plums did not have their rest period adequately broken by the winter temperatures of 1956–57. The prolonged dormancy which resulted was manifested by irregular blossom distribution on the tree, and a longer than normal blossoming period for some varieties. Other varieties had a delayed blossoming season, as well as delayed leaf formation. In general, the earliest blooming plum varieties blossomed on about their average date, which indicated that they have a short chilling requirement since their rest period was broken at about the normal time in spite of the mild winter.

The winters of 1958–59, 1959–60, and 1960–61 were much colder than 1956–57 and none of the ordinary symptoms of prolonged dormancy were observed on the plum varieties in this test. The total length of the blossoming season for all varieties varied from 3 to 5 weeks in different years, as indicated in Table 1.

Table 1. Winter temperatures and dates of full bloom for plum varieties at State College, Mississippi.

Winter	*Mean temp.* Dec.–Jan.*	*Dates of full bloom*	
		Earliest variety	*Latest variety*
1956–57	51.5°F	March 1	April 23
1958–59	43.5°F.	February 23	April 4
1959–60	46.3°F.	March 19	April 11
1960–61	41.8°F.	February 24	March 28

*Average of daily highs and lows.

The average dates of full bloom for 37 varieties are shown for the three-year period from 1959 to 1961 in Table 2. There is a period of a month between full bloom for the

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earliest and latest variety. This is more than twice as long as the length of the blossoming season between early and late blooming peach varieties at this location.

Table 2. Average dates of full bloom of plum varieties for a three-year period from 1959 to 1961 at State College, Mississippi.

Variety	*Average*
Mariposa	March 4
Hollywood	March 5
Red Ace	March 5
Burmosa	March 6
Lauderdale Seedling	March 6
Ozark Premier	March 8
Purple Plumcot	March 9
Redheart	March 10
Santa Rosa	March 10
Excelsior	March 11
Mammoth Cardinal	March 11
Methley	March 11
Sierra	March 11
Bruce	March 12
Howard Miracle	March 12
Myrobalan	March 12
Munson Yellow	March 13
Bonnie	March 14
Eureka	March 14
America	March 15
Starking Delicious	March 16
Yakima	March 16
Allred	March 17
Sapa	March 17
Elephant Heart	March 19
Brilliant	March 20
Ember	March 21
Bluefre	March 22
Gold	March 22
Omaha	March 22
Hanska	March 23
Underwood	March 24
Redcoat	March 25
Monitor	March 26
Pipestone	March 30
Giant Damson	April 3
Red Giant	April 4
Average	March 16

The yearly average for all varieties was: 1959—March 11; 1960—March 29; 1961—March 8.

Deciduous trees in a temperate climate enter a rest period in the fall, and their buds will not grow normally the following spring unless they receive the proper amount of chilling. This is often expressed as the "chilling requirement" to break the rest period. It is sometimes expressed as the number of chilling hours at or below 45° F. After trees receive adequate chilling, their rest period is broken, and they are ready to begin growth when external conditions are favorable. The "heat requirement" for growth following the end of adequate chilling influences when a variety will show visible signs of growth. This "heat requirement" varies with varieties of some kinds of fruits such as apple, pear and plum. The "heat requirement" for small peach trees which have been given adequate chilling in refrigerators, and then placed in a greenhouse at 60° F. or higher, is often two weeks or more.

The daily mean temperatures for 30 days at 10-day intervals preceding full bloom for early, midseason and late blooming varieties are shown in Table 3. These figures show that the mean temperature for 30 days prior to full bloom of late varieties was about 9° F. warmer than for early varieties for the three-year period. The late blooming varieties have a higher "heat requirement" for growth than early blooming varieties.

This "heat requirement" for blossoming might also be expressed in time-heat units at or above some threshold temperature such as 55° or 60° F. The number of hours of exposure to temperatures at or above 60° F. before blossoming occurs, would be considerably higher for the latest blooming variety than for the earliest blooming variety in this test. A better understanding of differences between blossom dates for varieties can be obtained by studying cumulative temperature records before blossom time.

Table 3. Summary of daily mean temperatures* in degrees F. at State College, Mississippi before full bloom of plum varieties.

Year	*Average date Full bloom*	*Days before full bloom*			*30 day average*
		1–10	*11–20*	*21–30*	
		Average for five earliest blooming varieties			
1959	Feb. 23	48.9°	50.5°	49.6°	49.7°
1960	March 22	41.5°	37.3°	40.8°	39.9°
1961	Feb. 27	58.1°	53.9°	39.6°	50.5°
Avg.	March 5	49.5°	40.9°	43.3°	46.7°
		Average for all 37 varieties			
1959	March 11	51.5°	48.0°	57.3°	52.3°
1960	March 29	51.1°	43.3°	35.1°	43.2°
1961	March 8	60.4°	59.1°	52.0°	57.2°
Avg.	March 16	54.3°	50.1°	48.1°	50.9°
		Average for three latest blooming varieties			
1959	April 1	57.5°	53.1°	53.5°	54.7°
1960	April 11	61.7°	57.2°	41.5°	53.5°
1961	March 24	58.5°	62.3°	54.7°	58.5°
Avg.	April 2	59.2°	57.5°	49.9°	55.6°

*Mean temperature refers to an average of the daily maximum and minimum temperatures.

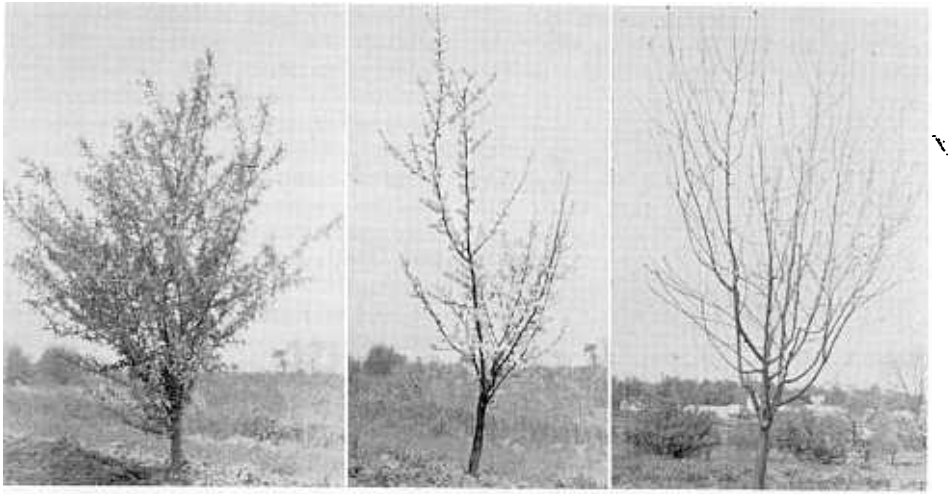

Fig. 1. **Differences in blossoming and foliation of three plum varieties on April 13, 1960, at State College, Miss. (Left—Methley; middle—Pipestone; right—Stark Damson)**