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Bloom Time in Low-Chill Peaches

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Abstract

Average bloom dates for low-chill peaches of various chilling groups at Gainesville, Fla., depends on the amount of chilling and heat units received. Full bloom dates for the 4 standard cultivars 'Okinawa', 'Sunred', 'Early Amber', and 'Sunlite', (representing 150, 250, 350 and 450 chill units, respectively) averaged about 10 days apart over the 35 years. The order of bloom from low to high chilling groups has no reversals in the last 35 years indicating the order of bloom is dependent upon chilling requirement. However, the dates of full bloom and the days separating full bloom of the standard genotype for each chill unit group vary each year.

Date of full bloom for low-chill peaches in Florida depends on climate and varietal chilling requirement. The climatic factors are the amount of winter cold and the heat units (warm weather) accumulated after requirement of winter cold is satisfied. The general winter climate is characterized by cold fronts moving across Florida about every 4 to 7 days. These fronts bring low temperatures which contribute toward the winter chill unit (cu) accumulation of peach trees as described in subtropical areas by Anderson and Richardson (1) and in the Florida breeding program by Sherman et al. (2). Between cold fronts, temperatures generally moderate in Florida with daily maximums reaching the upper 60's and lower 70's F, providing heat units for the trees after their winter chilling is largely satisfied.

In Florida, it is imperative that peach varieties be assigned to the correct latitude for reliable fruiting. If varieties are planted too far north of their area for chilling adaptation, their bloom is early and more subject to spring frosts; if planted too far south, their bloom is much delayed, often resulting in reduced fruit setting ability and misshapen fruit. Thus, all new varieties and new hybrids are evaluated for their chilling requirement based on time of bloom in relation to standard varieties. Standard varieties were chosen based on time of bloom and adaptation at various locations in Florida and assigned a relative chill unit requirement (150 = 'Okinawa,' 250 = 'Sunred,' 350 = 'Early Amber,' and 450 = 'Sunlite'). The full bloom dates for each variety is in Table 1.

The order of a full bloom (date of 50% bloom), recorded for 35 years in Gainesville for the standard peach varieties, was always consistent, with the lowest chill varieties blooming earlier than the next highest chill variety. This supports the hypothesis that the order of bloom is primarily dependent upon the amount of chilling. The shortest time between earliest ('Okinawa') and latest ('Sunlite') full bloom was 11 days, occurring in 1981 and 1994. The longest time was 69 days in 1972. On average, Gainesville receives about 420 chill units before February 10, but about half the years have less chilling. Varieties which bloom late for Gainesville (in early March) usually suffer reduced yields due to high night temperatures (above 58° F minimum) while the fruit is setting. For example, 'Sunlite' nectarine (450 cu) usually shows reduced fruit set at Gainesville when full boom is after March 1. Thus, for most consistent cropping, the best adapted varieties for the Gainesville area represent those near 350 chill units. These best adapted varieties bloom consistently with the wild plums (*Prunus angustifolia* Marsh. and *P. umbellata* Ell.) in the Gainesville area, an indication of what

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	Representative variety				
	Okinawa	Sunred	Early Amber	Sunlite	Annual range (days)
Estimated CU	150	250	350	450	
YEAR					
1964	1/23	1/30	2/6	2/15	23
1965	1/30	2/20	2/25	3/15	44
1966	1/28	2/16	3/1	3/4	35
1967	1/20	1/28	2/12	2/22	33
1968	1/30	3/4	3/9	3/20	50
1969	1/11	1/27	2/5	2/22	42
1970	2/1	2/10	2/15	2/21	20
1971	1/24	2/3	2/20	3/3	38
1972	1/10	2/20	3/12	3/19	69
1973	—	2/14	3/10	—	—
1974	1/15	-	2/15	—	—
1975	1/15	1/25	2/8	—	—
1976	2/9	2/16	2/23	—	—
1977	2/1	2/17	2/23	—	—
1978	2/13	2/27	3/7	—	—
1979	2/19	2/27	3/6	3/15	24
1980	1/30	2/10	2/19	3/2	32
1981	2/11	2/16	2/20	2/22	11
1982	1/20	1/28	2/8	2/18	29
1983	2/18	3/1	3/4	3/14	24
1984	2/6	2/9	2/12	2/18	12
1985	1/10	2/25	3/1	3/4	53
1986	2/5	2/10	2/20	2/26	21
1987	2/13	2/23	2/28	3/10	25
1988	2/1	2/11	2/22	3/8	37
1989	1/13	1/18	2/1	2/24	42
1990	1/22	1/25	1/30	2/4	13
1991	1/15	1/20	2/25	3/13	57
1992	1/31	2/14	2/20	2/27	27
1993	1/15	1/22	2/18	2/25	41
1994	2/6	2/9	2/12	2/17	11
1995	2/10	2/18	2/24	2/28	18
1996	2/10	2/14	2/16	3/2	21
1997	1/22	1/28	2/18	2/28	37
1998	1/26	2/2	2/20	3/4	37
Mean	1/28	2/10	2/20	3/2	—

Figure 1. Full bloom dates for representative peach varieties with their estimated chill units at Gainesville, Florida 1964 through 1998.

"mother nature" has evolved to be the most adapted peach relative.

The average full bloom dates for our standard varieties in Table 1 are about 10 days apart. The lowest chill varieties complete their chilling before higher chill varieties and begin accumulating heat units first, thereby allowing them to flower earliest. This average full bloom date reflects the amount of chilling that the varieties require or have received and a successful chilling model should be able to separate these 4 standard varieties by near equidistance in time of bloom.

The varietal variability of bloom dates within a single year reflects the time of occurrence of chill and heat units. Constant low temperatures, after winter chilling is satisfied, delay bloom because heat units are accumulated at a slow rate. Upon receiving adequate heat units, these trees flower quickly and uniformly. For examples, this condition was evident in 250 through 450 cu genotypes in spring 1968, 1979 and 1987. In 1968, the one month difference in bloom dates of the 150 and the 250 chill unit varieties was due to an unusually cold February and cool early March, in which those varieties of 250 plus chill units were delayed in bloom even though chilling had been satisfied. Likewise, in 1978, 1981, 1983, and 1987, January was cold with a cool February and early March resulting in all varieties being delayed in bloom even though chilling was previously satisfied in December in the lowest chill varieties. However, in some years at Gainesville the delayed bud break is from the inadequate amounts of winter chill units as was most evident by long periods of sporadic flowering in 1965, 1972, 1991, and 1995.

Blossoming of two adjacent chill unit groups with less than average number of days between each other, is usually a result of cold weather accumulating rapidly in a 2 to 3 week period in late December or January. In this event, the chilling requirement of both groups are met, but not enough heat units accumulate in the lesser chill variety to give it a full 10 days separation in bloom date. Some examples are in 1966 with 3 days between 350 and 450 cu, in 1968 with 5 days between 250 and 350 cu, in 1983 with 3 days between 250 and 350 cu, 1984 with 3 days difference between 150 and 250 cu, 1985 with 3 days difference between 350 and 450 cu, 1990 and 1994 with 3 days difference between 150 and 250 cu. Generally the earliest season for most chilling groups was 1990 and the latest seasons were 1968, 1978, 1979, 1983, and 1987.

In most temperate zones, peach flowering normally occurs 7 to 14 days prior to leafing. Thus, leaf buds are thought to require either higher chilling and/or more heat units to force than for flower buds. We have observed some years at Gainesville, when the lateral leaf buds of genotypes classified below 200 cu began to open either with or up to 7 days prior to full bloom. Furthermore, the genotypes up to 450 cu often exhibit early leafing in south and central Georgia. Observations of early leafing generally occur in years when cu of both flowers and leaf are met early in winter (early December in Gainesville and late December in central Georgia) but temperatures remain cool (35 to 36 F daily minimums). We hypothesize that under these conditions, leaf buds accumulate heat units at a lower threshold temperature than flower buds and thus leaf early.

Literature Cited

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