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Low Midwinter Temperature Injury to Peach Flower Buds in Georgia

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Abstract

Influence of 1985 low midwinter temperatures (-21°C) in Georgia on 172 peach and nectarine cultivars was determined by measuring flower bud survival on excised dormant shoots, and by rating bloom quantity and crop load. Flower bud survival ranged from 35% for 'Redhaven' peach to 0% for 'Junegold' peach. Data suggests that at least 10% flower bud survival is required for a full commercial crop.

Introduction

In southeastern United States peach production areas, minimum temperatures below -18° C are not common (3). Although not considered to limit peach production, low winter temperatures have the potential to significantly injure flower buds in southern and mid-Atlantic areas (2, 3, 4). Such a situation occurred in 1985.

On January 21, 1985, a record-low temperature of -21° C was recorded at the Southeastern Fruit and Tree Nut Research Laboratory in Byron, Georgia in the center of Georgia's peach growing region. During the preceding month of December, temperatures ranged from 26° to -7° C, with an average daily maximum of 21° C and an average minimum of 6° C. The station is the site of an extensive peach and nectarine cultivar planting.

Materials and Methods

On January 25, 1985 previous season's dormant shoots, 40-60 cm in length were collected from each of three to four unpruned trees of cultivars representing the major cultivars grown in central Georgia (1). Ten shoots from each tree were sampled at a 1.0-1.5 m distance from the ground. Samples were stored in plastic bags in a cooler at 3°F. On January 27, 1985, at least 300 flower buds of each cultivar were dissected except for 'Harvester' of which 250 buds were sampled. Flower buds were rated as dead if the internal flower parts were brown.

A visual estimate of bloom was made on March 14 using a 1 to 9 scale to rate stage of flowering (2 = bud swell; 4 = few pink buds; 6 = few open blooms; 8 = 90% full bloom) and using a 0 to 4 scale for quantity (0 = absence of bloom; 4 = several blooms at every node). When the fruit matured, an estimate of crop load was made on a 0-9 scale (0 = no fruit; 4 = half a commercial crop; 7 = a well-thinned commercial crop; 9 = heavy crop).

Results and Discussion

The data presented in this paper provide a general basis for comparing relative flower bud hardiness between selected cultivars. Percent flower bud survival is presented on the basis of highest to lowest survival (Table 1). 'Redhaven' had the highest flower bud survival of cultivars sampled. 'Redglobe' had some 38% the level of bud survival compared to 'Redhaven.' A similar relationship was found in previous sampling of peach flower buds following 1982 low winter tempera-

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Table 1. Peach flower bud survival and crop load for major cultivars following January 21, 1985 temperature of -21° C at Byron, GA.

Cultivar	Percent flower bud survival[z]	Bloom[y]		Crop load[x]
		Stage	Quantity	
'Redhaven'	34.7	5	3	7
'Harvester'	19.2	8	2	7
'Redglobe'	13.1	7	2	6
'Bicentennial'	10.3	8	2	8
'Redcap'	9.0	7	2	5
'Cornet'	5.1	8	2	5
'Sunbrite'	2.0	8	1	1
'Springcrest'	1.7	8	1	3
'Junegold'	0	8	1	1

[z]Estimated on a 0-9 scale (0 = no fruit; 4 = half a commercial crop; 7 = a well-thinned commercial crop; 9 = heavy crop). Trees not thinned.
[y]Bloom stage recorded on March 14, 1985 on a 1-9 scale. A 950-hour peach would be rated about 5 (pink bud); a 650-hour peach rated about 8 (90% full bloom). Bloom quantity rated on a 0-4 scale (0 = absence of bloom; 4 = several blooms at every node).
[x]Based on representative sample taken from uniform unpruned trees.

tures in Virginia (2). The relative pattern of flower bud survival between 'Redhaven,' 'Redglobe,' 'Redcap' and 'Coronet' was similar to that previously reported following low midwinter temperatures in South Carolina (4).

None of the trees represented in Table 1 were thinned. Even the cultivar 'Junegold,' where no surviving flower buds were recorded in January, was rated as having a light bloom and crop load. This discrepancy may have resulted from the presence of very small flower buds at the base of shoots as well as of flower buds on shoots within the canopy that were not detected in the sampling procedure. The influence of natural fruit drop characteristics of cultivars was not taken into account. However, data suggests that a least 10% flower bud survival is needed for what was considered a full commercial crop.

Crop loads and bloom of cultivars in Table 1 can be compared to those for other peach and nectarine cultivars at the station, estimated as previously described (Table 2). Cultivars are presented in alphabetical order. Most ratings represent the evaluation of 4 trees of each cultivar. Where individual trees varied widely, a range is given.

Subsequent discussions with peach breeders from other eastern states indicated that generally late-blooming, high-chilling cultivars best survived the January 21 freeze as is reflected in Table 2. Some ultra-hardy lines such as 'Reliance' and 'South Hero' had lighter crops than expected under these conditions. Another notable exception was the rootstock 'Nemaguard.' Despite being relatively early-blooming (750 hours of field chilling required), it cropped well as a scion in Georgia, North Carolina, South Carolina, West Virginia, and Arkansas.

Literature Cited

1. Hubbard, E. E. and J. C. Purcell. 1984. 1984 Georgia commercial peach tree survey. University of Georgia Experiment Station Res. Rpt. 463.
2. Myers, S. C. 1983. Low temperature injury to peach flower buds in southwest Virginia in 1982. Fruit Var. J. 36:30
3. Prince, V. E. 1966. Winter injury to peach trees in central Georgia. Proc. Amer. Soc. hort. Sci. 88:190-196.
4. Stembridge, G. E. and H. J. Sefick. 1966. The relative fruit bud hardiness and bud set of thirty peach varieties. Clemson University Department of Horticulture Research Series No. 80.

Table 2. Bloom and crop load at harvest on peach and nectarine cultivars following January 21, 1985 temperature of -21° C at Byron, GA.

Cultivar	Crop load[y]	Bloom[z] Stage	Bloom[z] Quantity
Peach			
Admiral Dewey	4	4	1
Allred Elberta	4	7	2
Ambergem	5	4	2
Angelus	5	8	2
Autumn Delight	5	7	2
Autumnglo	7	5	2
Babygold 5	7	7	2
Belle of Georgia	8	6	3
Biscoe	8	6	3
Blake	4	7	2
Brighton	7	7	3
Calred	6	7	1
Camden	4	8	1
Canadian Harmony	6	7	2
Candor	3	7	1
Cardinal	4	6	2
Carnival	6	7	2
Cary Mac	7-8	7	2
Champion	7	4	2
Chinese Cling	7	6	3
Clayton	8	5	3
Com-Pact Elberta	6	6	2
Correll	5	7	2
Cresthaven	7	6	2
Cullinan	5	7	2
Denman	4	7	1
Derby	6	7	2
Dewdrop[x]	7-8	5	2-3
Dixiland	7	4	3
Dixired	7-8	4	3
Dwarf Norman	7	8	2
Earliglo[x]	6	7	3
Early Loring	5	7	2
Early Redhaven[x]	6-8	7	3
EarlyRio	3	7	1
Elberta	6	6	3
Elegant Lady	0	8	0
Emery	7	5	2
Encore[x]	7	7	3
Envoy	6	6	2
Fairtime	6	7	2
Fay Elberta	7	7	2
Fireprince	8	7	2
Firered	7	8	2
Flamecrest	4	8	1
Flavorcrest	4	8	1-2
Flordaking	0	9	0
Goldcrest	2	8	1
Golden Jubilee[x]	8	6	3
Golden Monarch	7	7	2
Hagen Sweet[x]	8	6	3
J. H. Hale	4	6	1-2
Harbrite	8	6	2
Harken	8	7	2-3
Havis	7	8	2
Hiland	1	8	1
Heath Cling	4	7	2
Indian Blood	8	6	2-3
Jayhaven	8	5	3
Jefferson	6	6	2
Jerseyglo	3	7	1
Jerseyqueen	4	6	2
Jim Wilson	5	8	2
Juneprince	1	8	1
Keystone	5	8	2
LaFeliciana	3	9	0
LaPremier	7	5	2
Loring	7-8	7	2
Lovell	3	7	2
McNeely	0	7	1
Madison	8	7	2
Majestic	5	7	2
Marhigh[x]	8	8	3
Marqueen	5	8	2
Marsun	6	7	2
Maygold	5	8	2
Monroe	5	6	1
Mountaingold[x]	7	6	3
Nectar	8	5	2
Nemaguard	8	8	3
Newhaven	4-7	4	2-3
Norman	8	6	3
O'Henry	5	7	1
Ouachita Gold	2	7	1
Parade	4	6	1
Pekin[x]	8	7	2-3
Piedmontgold[x]	8	5	3

Table 2. (Cont.)

Cultivar	Crop load[y]	Bloom[z] Stage	Bloom[z] Quantity
Ranger	5	5	3
Redbrite	8	7	3
Redskin	7	7	3
Regina	5	7	2
Reliance	5	3	3
Rio Oso Gem	5	7	1
Rubired	5	6	3
Ruston Red	5	6	2
St. John	8	6	23
Sentinel	4	7	1
Sentry	6	8	2
Slappey	7	7	3
South Hero	4	3	3
Southland	8	8	2-3
Springbrite	2	8	1
Springold	3	8	1
Stagg	6	6	1-2
Starking Delicious	6	6	2
Stark Saturn (NJF2)	8	8	4
Starlite	4	8	1
Summergold	4	6	1
Summer Pearl	4	7	1
SunBright	4-5	7	1
Sunhigh	8	8	3
Sunland	6	7	2
Sunnyside	1	9	0
Sunprince	5	8	1-2
Sunqueen	6	6	1
Surecrop	6	6	2
Suwanee	5	8	1
Suzi-Q	1	8	1
Sweethaven	8-9	5	3
Texstar	2	8	1
Topaz	4	8	2
Tyler	6	6	2
Washington	4	6	1
Wild Rose	8	7	3
Winplo	5	7	1-2
Nectarine			
Armking	5	7	3
Carolina Red	5	8	2-3
Cherokee[x]	8	7	3
Columbia[x]	7-8	5	3
Crimson Gold[x]	8	7	3
Durbin	5	6	2
EarliBlaze	7	8	3
Earliscarlet	7-8	8	3
Early Bird	1	8	1
Early Sungrand	4	8	1
Fantasia	5	7	3
Firebrite	1	7	1
Flavortop	3	8	2
Francesco	6	8	3
Hardired	8	4	3
Harko[x]	8	5	4
Independence	3	8	2
LaFayette	3	3	2-3
Late Gold	5	7	3
LeGrand	7	8	2-3
Lexington[x]	7	4	3-4
Mericrest[w]	7	5	3
Miss Georgia 1980	5	7	2
Nectared #1	4	7	2
Nectared #4	7	7	2
Nectared #7	8	7	2
Pocahontas	5	7	3
RedGold	7	7	3
Redbud[x]	8-9	7	4
Snow Queen	5	7	2
Summer Beaut	3	6	1
Sunfre[x]	8	9	4
SunGlo	6-7	7	3
Sunlite	2	9	1
Sweet Melody	3	7	2

[w]Trees were hand-thinned due to heavy set.

[y]Estimated on a 0-9 scale (0 = no fruit; 4 = half a commercial crop; 7 = a well-thinned commercial crop; 9 = heavy crop).

[z]Bloom stage recorded on March 14, 1985 on a 1-9 scale. A 950-hour peach would be rated about 5 (pink bud); a 650-hour peach rated about 8 (90% full bloom). Bloom quantity rated on a 0-4 scale (0 = absence of bloom; 4 = several blooms at every node).