

EFFECT OF COLD TEMPERATURES ON FLOWER BUDS OF FRUIT

The temperature at which flower buds are injured depends mainly on their stage of development. Buds are most hardy when fully DORMANT. As they begin to swell, expand into bloom, and develop into fruit, the buds become less resistant to freeze injury. Temperatures before freezes affect flower bud hardiness. Buds are hardier if exposed to cold temperatures for 2 to 3 days before a freeze. Slowly developing buds are more resistant to cold injury. With a NON-hardy bud, the longer the exposure time to freezing temperature, the more extensive the cold injury. Bud temperatures tend to be lower than air temperature during radiation freezes. Bud hardiness varies with the variety.

Temperature Effects On Small Fruit Flower Buds (degrees F):

FRUIT Tight Balloon Full Green
Bud Bud Bloom Fruit

Strawberry 22 28 31 28
Red
Raspberry 25 27 29 27
Black
Raspberry 26 28 30 28

Blueberry: Withstands 25 F before opening and about 26 F in bloom. Newly formed fruit may be seriously injured at 27F.

Temperature Effects on Fruit Tree Flower Buds (degrees F):

APPLE (RED DELIC.) : PEAR (BARTLETT) :

.....:

Percent of : :

bud kill 10% 90% : 10% 90% :

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Silver tip 15 2 : Scales :

: Separate 15 0 :

Green tip 18 10 : :

: Blossom :
Half-inch : Buds :
Green 23 15 : Exposed 20 6 :
::
Tight : Tight :
Cluster 27 21 : Cluster 24 15 :
::
1st Pink 28 24 : 1st White 25 19 :
::
Full Pink 28 25 : Full White 26 22 :
::
1st Bloom 28 25 : 1st Bloom 27 23 :
::
Full Bloom 28 25 : Full Bloom 28 24 :
::
Post Bloom 28 25 : Post Bloom 28 24 :
::
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* PI= POSSIBLE INJURY
* SI= SEVERE INJURY

PEACH (ELBERTA) :PRUNE PLUMS (ITALIAN):

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Bud Kill 10% 90% : Bud Kill 10% 90% :
::
1st swell 18 1 : 1st Swell 14 0 :
::
Gr. Calyx 21 5 : Side White 17 3 :
::
Red Calyx 23 9 : Tip Green 20 7 :
::
1st Pink 25 15 : Tight :
: Cluster 24 16 :
1st Bloom 26 21 : :
: 1st White 26 22 :
Full Bloom 27 24 : :
: 1st Bloom 27 23 :
Post Bloom 28 25 : :
: Full bloom 28 23 :
::
: Post bloom 28 23 :

: CHERRY (BING/MONTMORENCY)

.....
: Amount of :
: Bud kill 10% 90% PI* SI* :
::
: Dormant -- -- 15-25 0-30 :
::
: 1st Swell 17 5 15 0 :
::
: Side Green 22 9 24 10 :
::
: Green tip 25 14 26 20 :
::
: Tight :
: Cluster 26 17 26 22 :
::
: Open :
: Cluster 27 21 28 24 :
::
: 1st white 27 24 28 24 :
::
: 1st Bloom 28 25 28 24 :
::
: Full Bloom 28 25 28 24 :
::
: Post Bloom 28 25 -- -- :
::
.....:

: APRICOT

.....
: Bud Kill 10% 90% :
::
: 1st Swell 15 -- :
::
: Tip :
: Separates 20 0 :
::
: Red Calyx 22 9 :
::
: 1st White 24 14 :

::
 : 1st Bloom 25 19 :
 ::
 : Full Bloom 27 22 :
 ::
 : In Shuck 27 24 :
 ::
 : Green Fruit 28 25 :

Temperature also has an effect on the growth of grape vines and buds at different stages of growth. Grape bud development stages are as follows:

Scale Crack (SC), is the first visible indication of growth. A small crack occurs between the hard outermost bud scales as the bud begins to swell.

During First Swell (S-1), the bud has swollen out of the hard outer bud scale and is globular, light brown(doe-colored), and fuzzy. No green or pink is visible as of yet.

When Full Swell (S-2) occurs, the bud has elongated (about 1.5 to 2 times as long as wide) one or more bulges of leaf tissue are visible and appear green or pink. The bud remains closed around the growing point.

During the fourth step, Bud Burst (B), the leaves have separated at the tip, usually exposing the growing point. No leaf is, as yet, at a right angle to the growing stem.

Expanded Shoot (ES) is the final step and occurs when the stem is 4-6 cm in length with 1-3 small leaves at right angles to the stem.

LT 50 is a term used to signify the temperature estimated to cause 50% kill. The following table enumerates the LT50 for Concord Buds at Different Stages:

Type of Freeze				
WHITE FROST	BLACK FROST*			
STAGE	Celsius	Fahrenheit	Celsius	Fahrenheit

SC -5.5 22 -9.5 15
S-1 -4.5 24 -8.0 17.5
S-2 -3.5 26 -7.0 21.5
B -3.0 27 -6.0 23
ES -2.5 28

The duration of conditions favoring a black frost is crucial. The protection here is ALL via supercooling and the length of exposure will influence critical temperature. For Michigan, the more conservative White Frost (HOAR FROST) conditions are more appropriate.

REFERENCES:

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