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**Crop Conditions**

FFF 97-03  
April 2, 1997

April is typically the start of the growing season for fruit crops, especially in the southern half of the state. In southwest and south central Indiana, early peaches are at pink, apples are in tight cluster, blackberries are at 3/4 to 1 inch shoots, and grape buds are swelling. Blackberries are at 1/2 inch green in West Lafayette, peach buds are swollen, apples are silver to green tip, and grapes are tight, but bleeding when cut. In northern Indiana fruit crops are still dormant. Though we've had some above normal temperatures at times over the past few weeks, recent cooler temperatures have delayed fruit crop development and timing appears to be about normal. There is increased chance of cold injury as plant development begins. Let's hope we have no severe cold over the next few weeks.

**Critical Temperatures:** There is a threat of frost or freeze damage anytime after plants have broken dormancy and buds begin to grow. The level of cold that fruit buds can take varies by species and stage of growth. The tables below give the critical temperatures

for various fruit crops at different stages of development. Though many environmental factors can influence the actual critical temperatures, these data give a good estimate of the temperatures at which to expect injury.

**Critical Temperatures for Flower Buds:  
Apples\***

Bud Development Stage <sup>a</sup>	1	2	3	4	5	6	7	8	9
Ave. Temp. for 10% Kill	15°F	18	23	27	28	28	28	28	28
Ave. Temp. for 90% Kill	2	10	15	21	24	25	25	25	25

\*For Red Delicious. Golden Delicious and Winesap approximately 1 degree hardier; Rome Beauty, 2 degrees hardier; except after petal fall, when all varieties are equally tender.

<sup>a</sup>Bud development stages are: 1=Silver Tip, 2=Green Tip, 3=Half-Inch Green, 4=Tight Cluster, 5=First Pink, 6=Full Pink, 7=First Bloom, 8=Full Bloom, 9=Post Bloom.

## Peaches\*

Bud Development Stage <sup>a</sup>	1	2	3	4	5	6	7
Ave. Temp. for 10% Kill	10°F	21	23	25	26	27	28
Ave. Temp. for 90% Kill	1	5	9	15	21	24	25

\*For Elberta.

<sup>a</sup>1=First Swelling, 2=Calyx Green, 3=Calyx Red, 4=First Pink, 5=First Bloom, 6=Full Bloom, 7=Post Bloom.

(From Washington State University Extension Information.)

## Grapes\*

Bud Development Stage <sup>a</sup>	1	2	3	4	5	6
Ave. Temp for 10% kill	Varies	13°F	21	25	27	28
Ave. Temp for 90% kill	Varies	-3	10	16	21	22

\*For Concord

<sup>a</sup>1=Dormant, 2=First swell, 3=Full swell, 4=Bud break, 5=1st leaf, 6=2nd leaf.

## Strawberries

Bud Development Stage	Buds Emerge	Buds Closed	Flower Open	Small Green Fruit
Ave. Temp for 90% kill	10°F	22-27°F	30°F	28°F

Duration of temperature for damage can be 20 minutes to 2 hours, depending on wind, humidity, and cultivar.

**Other Fruits:** Blueberries are more tolerant of spring frosts than most other fruit crops. Open flowers are not usually injured unless temperatures reach the low to mid 20's. Brambles are also relatively tolerant of spring frosts and freezes, partly because the flower buds are not exposed until a few weeks after budbreak. ID-168, the Indiana Commercial Tree Fruit Spray Guide contain a chart that describes the floral development stage and critical temperatures for several tree fruit crops not listed above.

**What Can You Do?** Though there isn't anything that can be done to control the weather, there are several things growers can do to lessen the risks of frost damage in orchards and vineyards. Orchard or vineyard floor management can influence the temperatures within a planting and subsequent damage.

During radiative frost events temperatures can be 6 to 8° higher in a planting with bare soil beneath the plants and a closely mown row middle compared to a planting with weedy rows and a thick row middle. Similarly, settled and firm soil holds more heat than tilled soil, and moist soil holds more heat than dry soil. Sandy soils tend to warm sooner, but loose heat quicker than heavier soils. The ideal orchard floor would be bare, firm, moist soil. The worst situation would be tall, dense cover crop and trashy rows. Evaluate your floor management practices to determine if improvements can be made. Sometimes a difference of 2 to 3° could be the difference between a good crop and no crop.

Overhead irrigation is one measure growers can use to prevent frost damage. It is used commonly on strawberries, but can also

be used with other small fruits, and to a limited extent, tree fruits. Overhead irrigation can prevent temperatures from dropping below 30°F even though the air temperatures may drop well below freezing. The principle behind this method is that as water freezes, heat is released. As long as an adequate layer of freezing water covers the buds, the temperature will remain at or near the freezing point. It is important to remember that a layer of freezing water must be present at all times. Ice without the continued application of water will not protect the flowers from freezing tempera-

tures. This means that the rate of application of water must be carefully monitored. The rate at which water freezes is dependent on several environmental factors, including air temperature, humidity, and wind speed. Generally, the lower the air and dew point temperatures, and/or higher the wind speed, the greater the rate of freezing. Application rates are generally low, about 1/10th of an inch per hour, but may have to be increased depending on the minimum temperature reached and wind speed. The correct rate of irrigation can be determined from the following table.

Air temperature at canopy level (°F)	Wind speed (mph)		
	0-1	2-4	5-8
At 50% relative humidity			
27	0.10 inches per hour	0.20	0.30
24	0.10	0.30	0.35
20	0.15	0.35	0.45
At 75% relative humidity			
27	0.05	0.10	0.20
24	0.10	0.20	0.30
20	0.10	0.25	0.40

Start irrigation when the temperature in the lowest part of the planting at canopy level reaches 34-32°F and continue irrigation until ice begins to melt after sunrise. Irrigation can be very effective for frost protection, but it can also create problems. On tree fruits and bush crops such as brambles and blueberries, a heavy ice load can break limbs and cause more damage than the possible loss of fruit buds.

**Apple Diseases:** Tight cluster to pink is a time for maximum disease control efforts. During this period primary scab spores often reach their peak; powdery mildew infection is occurring on new growth; cedar apple rust is discharging spores with each rain; and fire blight is building, ready to be carried to opening apple and pear blossoms. It's not a pretty picture!

*1. Apple scab:* As noted above, the potential for severe scab infection is high. The amount of scab is directly dependent on the frequency of spring rainfall. If we have a wet April, scab pressure will be high, if it turns dry, scab pressure will be low, spray accordingly.

*2. Rust:* The pink stage of apple growth generally coincides with the time rust spores begin to infect apple foliage and fruit. If rust is a chronic problem consider the use of a sterol-inhibiting fungicide such as Nova, Funginex (triforine), Bayleton or Rubigan.

*3. Powdery mildew:* If mildew has been a chronic problem in certain blocks (Jonathan, Rome, Ida Red) the above mentioned sterol-inhibiting fungicides are excellent in helping to control mildew.

**4. Fire Blight:** Cool spring temperatures help prevent a rapid increase in the fire blight population; warm spring temperatures can cause very sudden, dramatic increases in the fire blight population. Here's hoping for a cool spring.

**Apple Scab:** Apple scab infection was above normal last year, you should therefore expect an above normal amount of primary scab spores this spring. The most important time of year for scab control is from green tip to petal fall. If you don't control scab during this period it's an uphill struggle the remainder of the season. Be sure sprayers are properly calibrated; thoroughly read the label of all pesticides you will be applying; use sufficient water to provide good coverage; choose calm, good drying conditions for spraying (Good luck on this suggestion); prune trees so they have an open canopy allowing for good spray penetration; and maintain a tight schedule if wet weather persists during the primary scab period.

**Planting to Avoid Fireblight:** When establishing new orchard blocks, consider varietal susceptibility to fire blight. Blight control is easier if plantings of susceptible trees can be isolated. Avoid interplanting susceptible apple varieties (Gala, Braeburn, Fuji, Ida red, Jonathan, Lodi, Rome, etc.) with pears or in fields adjacent to pear plantings. In mixed variety plantings, set varieties susceptible to blight in solid rows for ease of spraying with blight control chemicals. Also, most of the more severe fire blight problems have occurred in orchards planted on poor sites. These sites can be characterized as having heavy, poorly drained, and/or highly acid soils. Planting trees on poor soil invites fire blight damage and poor fruit production.

**Brown Rot Of Stone Fruits:** Management of brown rot began last year after harvest...with the removal of all fruit, mummies and blighted twigs. It continues this year at pink with early

season fungicide sprays. We fortunately have an abundance of fungicides for use in control of brown rot. See ID-168, "1997 Indiana Commercial Tree Fruit Spray Guide", for a complete listing of suggested fungicides.

**Time for Apple Chemical Thinning Approaching:** In about a month or so we'll be into chemical thinning of apples, so now is the time to check sprayer calibrations and stocks of chemicals. Since a light crop was experienced in many places across the state last year, we can expect heavy flowering this year, so effective chemical thinning is going to be especially important for 2 reasons. Firstly we need to ensure good fruit size and quality for this year's crop - remember, we are expecting heavy flowering this spring. Secondly, good chemical thinning this year will be essential to make sure we get good return bloom next year and don't get into a biennial bearing situation. In the next issue of Facts for Fancy Fruit, we'll discuss what factors influence the effectiveness of chemical thinning.

**New Farmers' Market:** Vendor applications are now being accepted for the first annual Zionsville Farmers' Market opening June 21 in the heart of historic Zionsville. The weekly event will be held from 8 am to 11 am on Saturdays through September 20. The outdoor market will feature vendor-grown fruits and vegetables, cut flowers, herbs and bedding plants. Prospective standholders planning to sell processed foods such as jams, jellies and baked goods will be required to have an Indiana State department of Health permit. Craft items will not be accepted. Vendors will be charged a weekly \$10 fee per parking space. Special seasonal rates are available which guarantee vendors a location at the market throughout the summer. Prospective vendors should call (317) 873-6615 or (317) 873-4786 for an application or further information. The event is sponsored by the Zionsville Farmers' Market Committee of the Downtown Merchants' Association of Zionsville.

***Coming Meetings:***

**April 5** — Kentucky Vineyard Society Grape Pruning Session. Norma and Tom Collins' On the Rocks Farm. Lexington, KY. Contact Collins'. 606-272-5205.

**April 6** — Indiana Nut Growers Association Scion Wood Swap. Kokomo Lion's Club. Contact Bill Heiman. 317-643-4582.

**April 10-11** — New York Wine Industry Workshop. Geneva, NY. Contact Thomas Henick-Kling. 315-787-2277.

**April 24** — Northeast Indiana Fruitgrowers Twilight meeting. Details to follow.

**May 6** — Elkart County Fruitgrowers meeting at Tom Kerchers Orchard. Contact Jeff Burbrink (219-533-0554) for more information.

**May 7** — Twilight orchard tour and program. Eastern Indiana Fruitgrowers. Contact Harold Brown (317-747-7732) for further details.

**June 3** — Twilight orchard tour and program. Eastern Indiana Fruitgrowers. Contact Harold Brown (317-747-7732) for further details.

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