



Kentucky Fruit Facts

Research & Education Center
P.O. Box 469, Princeton, KY 42445

September 1999 (9-99)

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Fruit Facts can be found on the web at: <http://www.uky.edu/Agriculture/Horticulture/extension.htm>

Fruit Situation

The maturity date for apples is now running 10 to 14 days earlier than normal. Fruit size is generally smaller than normal and most of the contribution to fruit size came from early season rains. Early fruit drop has been a problem due to the high temperatures and drought. Unfortunately, none of the fruit stickers work well under drought conditions.

Apple growers should continue spraying for sooty blotch, fly speck, and fruit rot diseases. We have not seen much sooty blotch and flyspeck as yet due to the dry summer, but fruit rots are very evident. Make sure that the fourth codling moth generation doesn't catch you by surprise!

There is some indication that the EPA is going to focus more seriously on enforcing the Worker Protection Standards (WPS) in the coming season through the state regulatory agencies.
(Strang, Brown, Bessin)

Meetings

Sept. 11-12 - Gourd Education Day, Natural Bridge State Park, Slade, KY. Classes will include Weaving, Painting, Pin & Ink, Woodburning. Contact Janet Barnet phone 502/477-8543, e-mail JANETB01SPRynet.COM

Sept. 12 - Ohio Valley Harvest Festival, Waterfront Park, Louisville, KY, noon to 6:00 p.m.

Contact J. K. Henshaw at Kentucky Farm Bureau, phone 502/495-5106, email: jkhenshaw@kyfb.com See August Fruit Facts article.

Sept. 16 - National Small Farm Field Day and Kentucky Farm Safety Day, Kentucky State University Research and Demonstration Farm, Mills Lane Frankfort, KY. 9:30 a.m. - 5:00 p.m., Bonfire Discussion from 5:00 p.m. - 9:00 p.m. Program tracks will be: Livestock; Aquaculture and Water Quality; Vegetables and Horticulture; Crops and Forages; and Home Economics. The Governor will sign the Proclamation for Kentucky Farm Safety Week with live rescue demonstrations during the field day. The Keynote Speaker will discuss Sustainable Agriculture Issues and Concerns. Contact 502/564-5871 or 5869. See August Fruit Facts for more information.

Sept. 17 - Farm Tours of Small Farm Agriculture Interests, KSU Research and Demonstration Farm, Frankfort, KY. 8:30 a.m. - 1:00 pm. Contact 502/564-5871 or 5869.

Oct. 21 - The Second Annual Pawpaw Field Day, Kentucky State University Research Farm, Frankfort, KY. Please RSVP, so we have an idea of how many of you are coming. For a list of hotels in the area, call Ms. Jean Ward at 502-227-6174. For additional information call 502-227-5942 or see our web page at <http://www.pawpaw.kysu.edu/events.htm>. See August Fruit Facts for more information.

Oct. 23 - Kentucky Vineyard Society's Annual meeting, Maker's Mark Conference Center, Loretto, KY. Contact Mitchell Wagner phone: 502/459-6958, Fax:

Blueberry Cultivar Trial

The blueberry is a fruit crop that is native to North America. At present, Kentucky has a small established commercial blueberry market and an excellent potential for local sales, U-pick and home use. This report updates earlier results reported in the January 1998 issue of Fruit Facts on the blueberry cultivar trial established in the Spring of 1993, at the UK College of Agriculture Research and Education Center, Princeton, KY.

The planting consists of eight cultivars spaced 4 feet apart within rows and spaced 14 feet apart between rows. The pH was reduced from above 6 to 5.4 with elemental sulfur prior to planting. The planting is mulched yearly with sawdust and trickled irrigated with 1 gph vortex emitters. The planting is netted during the last week of May, and fruit is harvested from the first week of June thru the first week of July.

Cumulative yield from 1995 thru 1999, the 1999 yield, and average percent fruit ripe by the end of the 2nd and 4th week of June, are shown in Table 1. Duke and Sierra have produced the most fruit to date. Duke has also been the earliest ripening cultivar in our planting with 14.3 % of Duke's fruit ripening during the first week of June. Sunrise also ripens early with 7.7% of its fruit ripening during the first week of June. Picking for the other cultivars begins during the 2nd week of June and is pretty well finished for all cultivars by the end of the 4th week of June. An exception would be Nelson which is picked thru the first week of July.

These results can be useful to growers in selecting blueberry cultivars, since avoiding labor peaks and time of harvest that conflict with production and/or harvest of other crops may have to be weighed against choosing the highest yielding cultivar.

Another factor one may also want to consider in selecting a cultivar is berry size (Figs. 1 and 2), which may vary from the size of a pea to the size of a cherry. Small berries are often preferred for cooking, while large ones are typically preferred for fresh use.

Finally, one may also wish to consider how easy or difficult it may be to harvest or pick a particular cultivar. Pickers at Princeton, reported that cultivars from easiest to hardest to pick were: Toro, Duke, Sierra, Sunrise, Bluecrop, Bluegold, Nelson, and Patriot.

This article describes the results from the first five harvests from this planting and will be updated periodically. (Wolfe and Brown).

Table 1

Blueberry Cultivar Trial¹
 UK Research & Education Center
 Princeton, KY 42445

| Cultivar ² | Cumulative | Yield (lbs./bush) | | Average Percent Ripe Fruit at end of week in June | |
|-----------------------|------------|-------------------|------|---|--|
| | | 1999 | 2nd | 4th | |
| Duke | 32.4 | 9.3 | 55.1 | 93.7 | |
| Sierra | 28.9 | 7.8 | 32.2 | 90.9 | |
| Bluecrop 24.7 | 6.7 | 28.7 | 79.1 | | |
| Blue Gold | 24.5 | 8.8 | 32.9 | 78.2 | |
| Toro | 23.6 | 6.2 | 27.1 | 76.2 | |
| Nelson | 22.3 | 5.9 | 14.6 | 66.7 | |
| Sunrise | 17.8 | 5.7 | 53.0 | 95.2 | |
| Patriot | 16.2 | 5.4 | 47.4 | 93.8 | |
| Lsd (0.05) | 4.2 | 1.9 | 5.4 | 2.4 | |

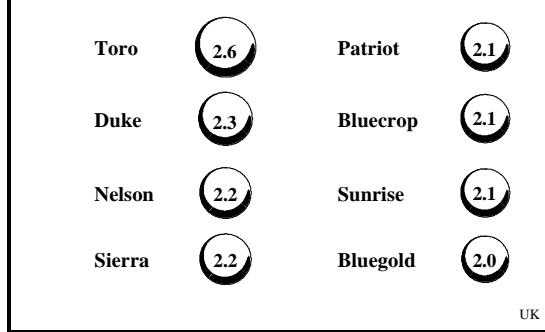
¹The planting was established in April, 1993. Plant spacing is 4 feet between bushes in rows 14 feet apart. There are three bushes per cultivar-rep combination.

²In descending order of cumulative yield (1995-1999).

Fig. 1. Average berry size (grams/berry) for year 1999.
 Bushes were planted in 1993 at UKREC, Princeton, KY



Fig. 2. Average berry size (grams/berry) for years 1995-99.
 Bushes were planted in 1993 at UKREC, Princeton, KY



Apple Cider Report

As the 1999 cider making season approaches, it is essential that we know the current status of regulations regarding this product and, perhaps, some future happenings for cider producers. We, along with John Sanford from the TN Dept. of Agriculture, attended an "Apple Cider Food Safety Control Workshop" sponsored by FDA in Washington, D.C. on July 13 and 14. The purpose of this workshop was to clarify existing regulations concerning the manufacture of apple cider and to dispel some misconceptions.

HACCP (Hazard Analysis Critical Control Points) - An approved HACCP plan will not be required for the 1999 cider season. FDA is still reviewing this step and will not have a final decision in place for this season. The original proposal indicated that a HACCP plan might not be required for producers making less than 40,000 gallons. Do not expect this qualification to stand. Instead, expect that all commercial cider producers will have to have a HACCP plan, regardless of the number of gallons made. However, it still appears that the requirement will be phased in according to the size of the operation. Small producers may have two or three years to develop their plan.

Ultraviolet light (UV) - Existing use of ultra violet light in foods is for a lower intensity than what will be needed for cider. The higher intensity UV necessary for cider will require approval by FDA. The use of ultraviolet lights to achieve the 5-log reduction in microbial load will not be approved in time for the '99 cider season, but the outlook for this technology looks very good. FDA is currently reviewing the proposal and comments are favorable at this time.

AFDOS (Association of Food and Drug Officials) has gone on record with recommendations concerning thermal pasteurization equipment that will spell out details for what is needed.

Promising technologies: Several technologies that may have the capability of giving the 5-log reduction necessary to avoid using the warning statement on cider containers are being researched and may be approved for use in the future. It may be several years before these receive approval. They include: ozonation, chemical additives, pulse light radiation, freeze/thaw cycles and hot water.

Current research: Studies are ongoing to determine the location of contaminants with apples. Is it surface internal or both? If contaminants are found inside the fruit, treatments to achieve the 5-log reduction will be restricted to crushing and later in the process. Efforts to remove microbial contamination on the surface of the fruit would have reduced effects if contamination was on both the surface as well as inside the fruit and totally

ineffective if contamination was entirely internal.

Good Agricultural Practices - Food safety and food quality are two different things but they go hand-in-hand. GAP's and GMP's (discussed later) are concerned with food safety and to not take quality into account. However, to stay in business, both of them must be considered. Apples used for cider should be tree-picked, sound and of good quality (free of insects and diseases). Good quality cider cannot be made from poor quality fruit. The same can be said for safe cider.

E. coli O157:H7 is still the bacteria of most concern although several others are being investigated. *E. coli* O157:H7 is a fecal contaminant of ruminant animals (cattle, deer), humans and birds. Flies are carriers of it. Due to the potential for contamination of apples in the field, GAP's (Good Agricultural Practices) are presented as a way to minimize the risk of early contamination. The use of drops for cider is strongly discouraged as it presents perhaps the greatest potential of contamination prior to the cider making operation. Using them is also a way to lessen cider quality as well as cider safety. When the HACCP requirement becomes a reality, GAP's will be an important part. Many of the recommendations are good practices from a production standpoint anyhow, so HACCP will just necessitate that we document what we are already doing.

Cider making is a food manufacturing process and, as such, its production must adhere to established GMP'S (Good Manufacturing Processes). These GMP's have been on the books for many years. However, only recently have regulatory agencies shown much concern with them for apple cider production. This trend will intensify. The Food and Drug Administration has a whole new commitment to raw and minimally processed fruit and vegetable safety, as evidenced by the FDA publication of the new "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables." Juices like apple cider are just the first step. Below is a list of GMP's affecting cider manufacturers:

1. The pressing area should be totally enclosed (doors and windows closed or screened) to exclude insects and rodents.
2. All food contact surfaces shall be made of food grade material.
3. All PVC piping and fittings should be replaced with impervious food-grade material.
4. Wood should be replaced with food-grade material.
5. Floors and walls should be made of easily cleaned and sanitized material.
6. **Wash up after running** to prevent the buildup of organic material that can harbor microorganisms, attract insects and rodents and cause metal surfaces to rust.

- 7. **Sanitize equipment and work areas immediately before running** to reduce microorganism contamination of product.
- 8. All water used should be potable. Well water should be tested by the health department according to the local regulations.
- 9. Maintain a 50 to 200 ppm (parts per million) chlorine level in the dump tank. This requires frequent testing as organic materials such as dirt can deplete chlorine levels rapidly. Water in dump tanks can become contaminated and actually increase microbial contamination on fruit if close attention is not paid to this point.
- 10. If water is to be recycled in the process, be sure to send water from the cleanest part of the process (washer/brusher) back to an earlier stage such as the dump tank where the water may not need to be as clean.
- 11. Train employees in personal hygiene, SOP's (standard operating procedures) and SSOP's (standard sanitary operating procedures). Stress the fact that they are working in a food manufacturing operation and that these practices are very important. As a GMP in a food processing operation, the California Health Department is requiring that workers in the cider-making process area wear plastic gloves as a way to further insure good personal hygiene. But remember, wearing gloves does not replace the need for proper handwashing.
- 12. Filter cloths (press cloths) must be properly cleaned, sanitized and dried after each run using only food grade cleaners and sanitizers (no laundry detergents) and air-dried in an enclosed, protected area.

Apples to be used for cider should be held in cold storage until pressing for several reasons. First, cold temperatures slow down the build up of many microorganisms on the surface of the fruit. Second, cold apples press better than warm apples. Finally, putting apples into water that is colder than they are can result in infusion of bacteria from the water into the apples.

Regulations regarding labeling of apple cider that has not been treated to achieve a 5-log reduction in microbial load begin September 9, 1999. Beginning on this date, individual containers must carry a warning label. Last year, we had the option of labeling containers or displaying a warning sign or placard at the sales point.

Wording of the warning statement is quite specific and must read as follows:

WARNING: This product has not been pasteurized and, therefore, may contain harmful bacteria that may cause serious illness in children, the elderly, and persons with weakened immune systems.

- The word **WARNING** must be printed all in capital letters and be in bold type.
- Type size must be a minimum of 1/16 inch for all words in the statement.
- The warning statement must be in a box set off by hairlines.
- The warning statement can appear either on the information panel (the label panel immediately to the right of the principal display panel) or on the principal display panel (that part of the label most likely to be seen by the consumer at the time of purchase, generally the front of the package.)

A separate warning label may be used provided that it is affixed to the container in a prominent location, as outlined above.

What products are **not** required to carry a warning label?

- 1. That which is to be consumed on the premises.
- 2. Juice not for distribution to retail customers and to be used solely in the manufacture of other foods or to be relabeled or repackaged before sale to retail customers provided that the lack of processing to achieve a 5-log reduction is disclosed in documents (invoices, bills of lading) that accompany the ingredient. Note that the repackaged product being sold to consumers for off-site consumption must carry the warning label.
- 3. Those treated in a manner to achieve a 5-log reduction in bacterial load.

Juice (cider) that has been pasteurized **cannot** be labeled as "fresh." (Dave Lockwood and Bill Morris, University of Tennessee)

Late Season Diseases of Fruit Crops

Despite the summer-long drought, some fruit crop diseases still managed to appear in Kentucky.

Thread blight. Apple trees with dead, curled leaves clinging to interior branches were observed in some locations in eastern Kentucky. A Diagnostic Laboratory specimen received from Leslie County reminds us that this disease can be persistent despite a region-wide drought. At first glance, the disease resembles fire blight, but closer examination reveals blighted leaves in mid-branch with green leaves still growing on either side of the blighted area.

Positive diagnosis is made by observing

signs of the fungus. The most obvious sign is the presence of the fungus on the twigs and branches as silvery-tan 1/16 inch wide rhizomorphs and white to tan 3/16 inch cushion-like sclerotia, which become hard and dark brown with age. When the disease is active on leaves, a sparse, white mycelial fan may be observed on partly-blighted leaves. This mycelium can often be traced back as fine threads to the leaf petiole and twigs. Abscised leaves may dangle from the branch, tied to twigs and leaves by this network of threads and mycelium.

Thread blight is caused by the fungus *Corticium stevensii*. It is a chronic problem on apples and other woody plants in moist, shaded areas in many eastern Kentucky Counties. In the past, we have seen the disease on cherries, roses, viburnums, and dogwoods growing in the landscape, as well as on apples. Affected trees normally have not been treated with fungicides. Commercial apple growers normally do not see this disease because apples are pruned to reduce foliage moisture and the fungus is sensitive to most preventive fungicide treatments. Once established, however, the disease may be difficult to get rid of because of the persistent sclerotia of the fungus.

Bitter rot. Where drought has not spoiled the crop, apples are being harvested now throughout Kentucky. Bitter rot disease, caused by *Colletotrichum gloeosporioides*, or *C. acutatum* has been observed on fruits submitted to the Plant Disease Diagnostic Laboratory in recent weeks. Once established in the orchard, bitter rot is one of the more difficult apple diseases to manage.

Symptoms include light brown, circular, sunken lesions on the apple surface. Bitter rot causes a brown, cone-shaped, fairly soft decay in the flesh of affected apples. Under moist conditions, concentric circles of creamy to pink-colored spore masses of the causal fungus may be observed on the lesion surface. The fungus produces enormous numbers of spores which are readily disseminated by wind and rain, and which can cause new infections under warm, humid weather conditions. The fungus survives in dead or weakened branches and in mummified fruits.

To manage bitter rot, in winter, prune out diseased branches and remove mummies from the tree and from the ground. The fungicides captan, ziram, thiophanate-methyl, and benomyl are all moderately effective for protection of apple fruits against bitter rot. Follow pesticide labels for proper rates and timing.

Phytophthora root rot. Infected raspberries suffered greatly during the hot, dry weather. With root systems only capable of

sustaining the plants during moist weather, root rot-infected plants simply did not have the root system needed to withstand drought. The most common symptoms were wilt, scorching of the leaf margins, and death of the plants. Growers may be able to pick out infected areas of their raspberry plantings by observing those parts of the field where plants suffered the greatest losses. (Hartman)

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