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COLLEGE OF AGRICULTURE
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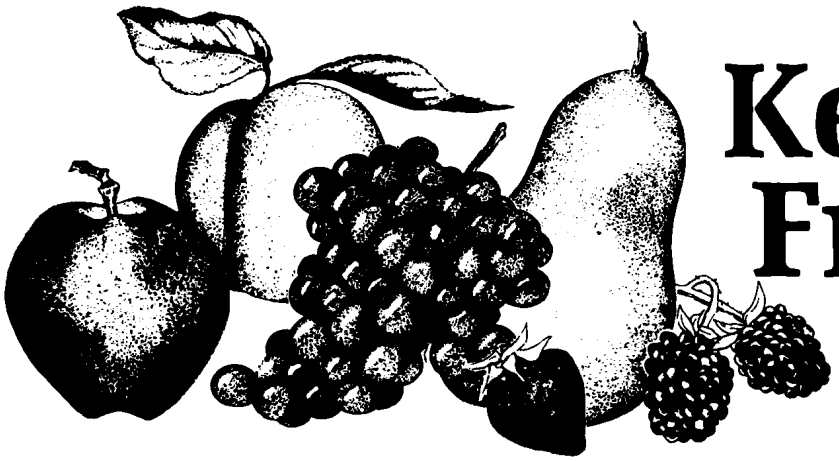

Kentucky Fruit Facts

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

March 1998 (3-98)
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Fruit Situation

The unusually mild winter in Kentucky is forcing fruit buds particularly early this year. Our best estimates are that we are 2 weeks earlier than normal and as of March 9 we have a full crop on all fruit crops. Comments on the apple-crop list serve group place fruit bud development in northwest Arkansas as 2-3 weeks early, the upper Mississippi as 4-5 weeks early, northwestern New Jersey at least 3 weeks early, and Washington State on schedule.

Meetings

Mar. 17 - Extension Expo., Home Fruit Production, Jackson, KY. Contact Lowell Hamilton 606/666-8812.

Mar. 31 - Grape Production, Carroll County, Contact Tim Hendrick 502/732-7030.

May 20 - Commercial Apple IPM Meeting, Schlei's Orchard, Hopkinsville, KY.

Jun. 14 - Kentucky Herb Festival, Lakeview Park, Frankfort, KY. Contact Sue Clifford 606/234-1452.

July 16-19 - International Herb Association Annual Conference, "Herb Smart Day" open to the public, July 19. Contact International Herb Association 847/949-4372, www.herb-pros.com.

Fire Blight Management Update

The risk for major tree and limb loss due to fire blight is greater in Kentucky today than 10-20 years ago because we grow apples differently now. There has been a shift to more susceptible apple cultivars such as Braeburn, Empire, Fuji, Gala, Gingergold, Granny Smith, and Jonagold. Orchards may now have 500 - 1000 trees/acre compared with 100 - 200 trees and highly susceptible dwarfing rootstocks such as M-9 and M-26 are being used to obtain these high tree densities. New training methods and the push to early bearing with less vegetative growth may foster greater disease incidence and severity. Finally, there is only one effective chemical, streptomycin, available for fire blight management, and fire blight bacteria resistant to streptomycin have been observed in nearby states.

<u>Why is fire blight so difficult to control?</u>

* The fire blight pathogen, *Erwinia*

amylovora is capable of living freely on the surface of both susceptible and resistant apple trees.
* At temperatures between 65 and 70°F, the bacteria double every 20-30 minutes so huge numbers of bacteria (a trillion cells in just a few days) may be poised at any moment to cause infection.
* Fire blight bacteria are dispersed widely by wind, water, and insects for several weeks or a month before actual infections occur.
* Blossom infections can occur in just a few minutes, so a single wetting event, washing the pathogen into the base of the blossom, establishes thousands of blighted spurs very quickly.
* Each new infection provides trillions of new bacteria for dispersal by wind, water, and insects.
* Infected blossoms fuel a continuing epidemic of shoot blight.
* If hail or high winds then develop, even resistant trees such as Delicious can become infected.
* M-9 or M-26 rootstocks can become infected with fire blight directly from the scion. Infection of root suckers or trunk wounds is not needed. Rootstock blight symptoms include active cankers 2-4 weeks after scion symptoms appear followed by rapid death of the tree in July, a more gradual death in autumn if the cankers only partly girdle the trunk, or decline and death of the tree the following spring.

Fire Blight must be managed astutely and aggressively.
* During dormant pruning operations, all visibly infected shoots, spurs, and limbs must be destroyed.
* Thoroughly cover all bark and bud surfaces with a copper spray at green tip.
* Use streptomycin during bloom the day of or the day before infection. The MARYBLYT computer program has worked well in Kentucky as an aid to determining just when to spray.
* Remove all blighted spurs and shoots as soon as they appear - not just as soon as you notice them, or as soon as the number of new strikes seems to slow down. Again, MARYBLYT has proved useful for determining exactly when first symptoms should appear. There is no such thing as a little bit of fire blight; a little can soon become a lot if inoculum sources are not removed. If infections cannot be removed within two days of their appearance, it may be best to let nature take its course and concentrate on salvage pruning where the infection threatens to enter the main limbs. The late removal of blighted shoots is little more than revenge, because the bacteria they release have already been dispersed throughout the orchard.
* If cutting is done, use the "ugly stub" method where blighted shoots are cut 8-12 inches below any visible symptoms, but are cut so that a 4-5 inch stub of 2 year-old or greater wood is left. Cankers that develop on these stubs are then easily found and removed the following winter during dormant pruning.

Since streptomycin is such an important tool in fire blight management, it is important to use it effectively and guardedly. Alternatives to streptomycin are very limited.

Alternatives to Streptomycin. Copper containing fungicides can be used up to the green tip stage; after that they are toxic to the apple trees. The purpose of the copper fungicides is to prevent fire blight bacteria from building to high populations on the surface of the tree twigs and branches early in the season where they can later be spread by insects to the flowers. Thus copper must be applied to all the trees in the orchard, not just the most susceptible trees, because fire blight resistant trees still can support high populations of bacteria on their bark and buds that could be spread to susceptible ones elsewhere. Although copper is useful, it cannot be relied upon by itself to control fire blight.

The fungicide Aliette, used for Phytophthora collar rot disease management is also registered for control of blossom infections by fire blight. This chemical has been shown to be too unreliable to provide good fire blight disease control.

Bioantagonists, bacteria that might compete with or combat the fire blight bacteria, may someday be useful. There is one commercial product, Blight Ban, made from a strain of *Pseudomonas fluorescens*, Pf-A506, that is apparently only effective when the antagonist bacteria are present on the flowers before the fire blight bacteria. Another bioantagonist, *Erwinia herbicola*, strain C9-1, is being tested. The bioantagonists, not being sensitive to streptomycin, may be useful in a fire blight management program when applied early and when combined with streptomycin during bloom, but should not be relied upon alone for best fire blight management.

Preserving the effectiveness of streptomycin:
* Use streptomycin during bloom only, making from zero to four applications, depending on the results of the MARYBLYT computer program, or four times at four day intervals.
* Do not use streptomycin to prevent shoot blight or canker blight because it is not effective.

* Use good cultural practices to reduce fire blight; never apply streptomycin when fire blight symptoms are already present in the orchard - except it might be used immediately after hail or high wind where there is a risk for trauma blight, but it can only be used more than 50 days before harvest.

Research on fire blight management is still going on in laboratories throughout the world. The work of Dr. Paul Steiner, University of Maryland, has been particularly useful when applied to Kentucky conditions. Many of his concepts have been incorporated into this article. (Hartman)

Expect Private Applicator Pesticide Records Check

A random sample of private applicators were contacted last winter to determine whether or not they were comply-ing with record keeping requirements of their use of Restricted Use pesticides.
A random check will probably occur again this year.

The record keeping requirement was implemented as a part of the 1990 Farm Bill and became effective May 10, 1993. It requires that certified private pesticide applicators must keep records of their use of Restricted Use pesticides. Sometime within the next few weeks, inspectors will arrange to visit about 150 randomly selected private applicators in Kentucky to see if they have the appropriate records. Individual applicators will be contacted by the inspector to schedule an appointment. There will be neither fines nor penalties associated with these records checks. (Johnson)

Pesticides and Vehicle Safety

The safest way to transport pesticides is in the back of a truck. Flatbed trucks should have side and tail racks. Steel or plastic-lined beds are best, because they can be more easily cleaned if a spill occurs. Never carry pesticides in the passenger section of your car, van, or truck. Hazardous vapors may be released and make the driver and other passengers ill. Pesticides may cause illness or injury if they spill on you or your passengers. It is nearly im-possible to completely remove spills from the fabric of seats and floor mats. They can cause future contamination if they are not cleaned up correctly. If you must transport pesticides in the back of a station wagon, open the side windows and do not allow anyone to ride in the back. Never allow children, other passengers, and pets to ride with pesticides. Never transport pesticides with food, clothing, or other things meant to be eaten by or in contact with people or animals. The risk of contamination is too high. Even small amounts of pesticide could contaminate these highly sensitive items. A spill could cause major injury.

Never leave your vehicle unattended when transporting pesticides in an un-locked trunk compartment or open-bed truck. You are responsible and liable if curious children or careless adults are accidentally poisoned by the pesticides. Whenever possible, transport pesticides in a locked compartment.

Consider transporting highly volatile pesticides in separate trips from other chemicals. Spills, or even fumes from opened containers, can make the other chemicals worthless. (Johnson)

UK/KSHS Project: Training Apple Trees for High Density Plantings

Early production and optimal fruit size on vigorous sites are obtained when photosynthates are balanced properly between flower bud initiation and vegetative growth. Kentucky growers typically have a problem with excessive vegetative growth or vigor, which greatly reduces the production that can be achieved from high density apple plantings without this problem.

Pruning and training are possibly the most important techniques used by fruit growers to maintain the proper balance between flower bud initiation and vegetative growth. Identification of effective pruning and training techniques for vigorous sites is required for continued expansion of apple production in Kentucky. The University of Kentucky College of Agriculture, and the Kentucky State Horticulture Society have each made a long-term commitment to help meet this need.

In order to determine the training and pruning practices needed to obtain early production and optimal fruit size from trees on vigorous sites trained to either the slender spindle or the French axe system, 180 trees of Golden Delicious on M.9 rootstock were set out in May 1997 in a randomized complete block design with eight treatment combinations (5 rows, 32 trees/row). Trunk circumference averaged 61 cm at planting and did not vary significantly among rootstocks. A trellis

was constructed, and trickle irrigation was installed. The trees were trained according to the treatment protocol (Table 1). During the first year, neither trunk circumference (Table 2) nor training time (Fig.1) varied significantly in the analysis of variance. All trees are currently alive. Over half the total time spent training the trees was spent during the first 4 weeks the trees were trained (Fig.1). In fact, there was approximately a 50% reduction in time needed to train each tree during the second week than was needed during the first week. A similar reduction in time was observed in going from the second to the third week. After several weeks of tree training, approximately one half minute or less was needed to train a tree.

This along with other plantings are regularly used as demonstration plots for visiting apple growers, extension personnel, and research scientists. The research data collected in these trials will help to establish base-line production methods and an economic basis for the various orchard system/rootstock combinations, which can be later utilized by orchardists in Kentucky. (Brown, Wolfe, and Johnston).

TABLE 1.UKREC 1997 APPLE TRAINING STUDY
1997 PRUNING/TRAINING TREATMENTS
(FrAx=French Axe, SlSp=Slender Spindle)

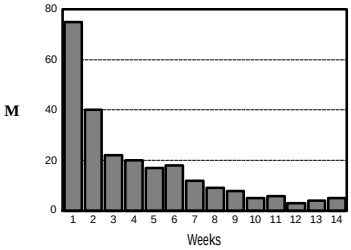
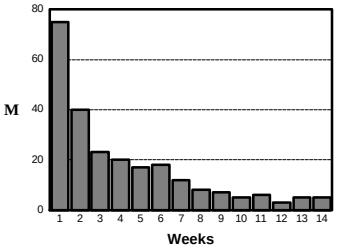
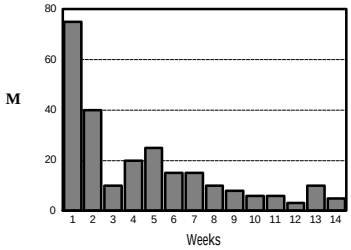
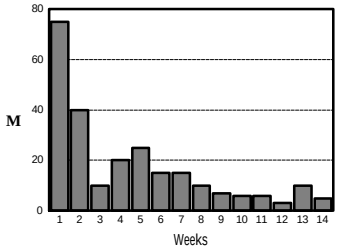
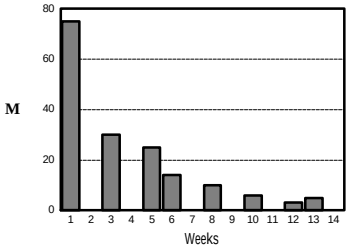
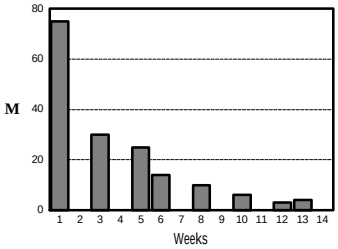
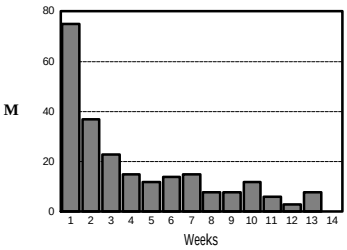
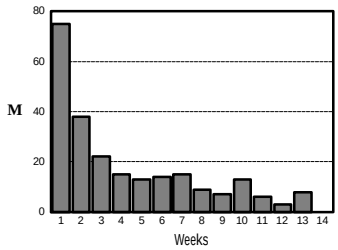
System	Level	Headed at Planting	Angle[1]	Limbs[2]	Leader[3]
FrAx	Light	No	45	No	A
FrAx	Mod.-Wkly	12-16"	45-60	Yes	B
FrAx	Mod.-bimthly	12-16"	45-60	Yes	B
FrAx	Heavy	8-12"	60-90	Yes	C
SlSp	Light	No	45	No	A
SlSp	Mod.-Wkly	14-20"	45-60	Yes	B
SlSp	Mod.-bimthly	14-20"	45-60	Yes	B
SlSp	Heavy	10-14"	60-80	Yes	C

[1]Angle limbs are to be positioned.
[2]French Axe completely remove overly vigorous branches with narrow angles when 3" to 6"long. Slender Spindle completely remove branches that compete with leader.
[3]Leader management:A=plastic wrapper used in the spring to June 1;B=bend leader to horizontal,alternating direction weekly; C=head leader at 18" above top branch

Table 2. UKREC 1997 UK-KSHS 1997
Apple: Training Study 1997 Results

Pruning Level	Trunk Circumference (mm) French Axe	Slender Spindle
Light	69.8	69.7
Moderate - weekly	68.9	70.5
Moderate - bimthly	68.3	67.9
Heavy	67.6	65.9
Mean	68.7	68.6
LSD (.05)		3.5

Figure 1. UK-KSHS 1997
Apple:Training Study 1997 Results

1997 M*	French Axe Training System (Minutes/20 Trees)	Treatment	Slender Spindle Training System	1997 M
244		Light/ Weekly		244
248		Moderate/ Weekly		247
168		Moderate/ Bi-monthy		167
236		Heavy/ Weekly		238

Mean/Season 224 M
Mean/Week 16.00 M

***M = Minutes** **UKREC 1997**

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John Strang, Extension Horticulturist