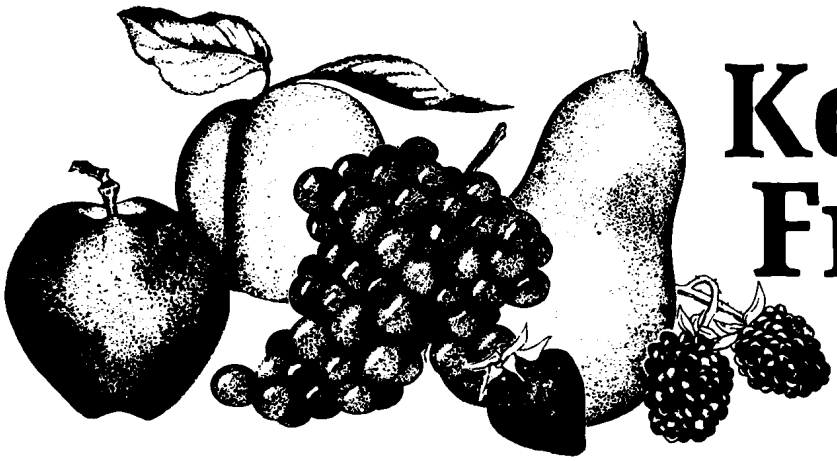
UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546

COOPERATIVE EXTENSION SERVICE



Kentucky Fruit Facts

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

June 2000 (6-00)
Prepared by John Strang, Terry Jones, and Jerry Brown, Horticulturists; John Hartman, Extension Plant Pathologist; Ric Bessin, Lee Townsend, Extension Entomologists; Tom Priddy, Agricultural Meteorologist; John Strang, Editor, Marilyn Hooks and Karen Shahan, Administrative Assistants

Fruit Facts can be found on the web at: http://www.ca.uky.edu/HLA/fruifact/

Fruit Crop and Weather Situation

The strawberry crop was considerably earlier than normal and considerably smaller than normal due to last years drought and the spring freeze.

Many growers are finding a few more apples on their trees than they previously thought. We are seeing quite a few “frost kissed” fruit, or apples with frost rings. Frost rings are caused by ice crystal formation just below the skin and the russeting is a wound repair response. We are through the period in which chemical thinners will work on apples. Selective hand thinning can be very beneficial on trees where apples have set in clusters. All fruit appear to be sizing well.

We continue to trap heavy numbers of codling moths in pheromone traps. Continue monitoring your orchard and spray accordingly. It is too late to spray for San Jose Scale. We have not seen any leafhopper or mite developments in orchards. All fruit uses of Lorsban are still good for this season. Expect to see more restrictions on the use of Lorsban and a gradual phase out of this product. Kerry Kirk will be calling apple growers to follow up on IPM Food Safety Survey.

The May rains have benefitted newly set fruit plantings. Maintain good weed control beneath fruit plants and keep new plantings watered.

In certain areas of the state we are seeing reduced crops and dieback on blueberries and fruiting canes of raspberries and blackberries. In the case of the blueberries this is mostly a result of last seasons drought stress. On raspberries and blackberries this seems to be a combination of anthracnose disease, winter injury due to early winter dehardening and drought stress.

We have had a number of reports of orange rust in raspberries and blackberries this season. Infected plants and roots need to be rogued from the patch and burned.

We received near normal precipitation for the month of May, however, the long range forecast is for above normal temperatures and below normal rainfall for June, July and August. Warm sea-surface temperatures in the Gulf of Mexico combined with weak-to-moderate La Nina conditions in equatorial Pacific could lead to enhanced tropical storms in the Gulf of Mexico. This could possibly bring some rainfall to Kentucky and the Ohio Valley during this hurricane season. (Strang, Bessin, Hartman, Jones, Priddy)

Meetings

Jun. 22 - Commercial Apple IPM and Blackberry Production Meeting, Billy Reids Orchard, 4818 Kentucky 144, Owensboro, KY, mkt. phone 270/685-2444. This will be an excellent opportunity for growers to see an outstanding high density apple planting and to learn how to prune and train trees to this system. Refer to program and directions in the May Fruit Facts.

Jun. 24 - Kentucky Vineyard Society Summer Meeting, Equus Run Vineyards, 1280 Moores Mill Rd., Midway, KY. Contact Cynthia Bohn 859/846-WINE, Fax 859/269-0541. See program and map below.

Jun. 24-27 International Dwarf Fruit Tree Summer Tour, Quebec, Vermont, and New York. Full details can be found on the IDFTA web site, http://www.IDFTA.org

June 27-28 – Indiana Horticultural Society Summer Meeting, Joe Huber Family Farm and Huber Orchard, Winery, Starlight, IN. This is a great opportunity to tour an outstanding operation. The tour will start at 3:00 p.m. at the Forest Discovery Center (just down the road west of the Huber operation). Dinner will be at 6:00 p.m. at the Joe Huber Family Farm Restaurant followed by a round table discussion. The tour of the orchard fields, market and facilities will begin at 9:00 a.m., finishing up in the afternoon at the Winery. Contact Dick Hayden 765/463-6587 or Peter Hirst 317/494-1323; e-mail: hirst@hortl.purdue.edu.

Jul. 1 - Central Kentucky Harvest Festival, Phoenix Park (near the downtown public library), Lexington, KY. The Harvest Festival will be held in conjunction with the Lexington 4th of July festivities. Contact Sue Weant 859/233-3056.

Jul. 19-21 - American Society for Enology and Viticulture, Eastern Section Symposium, Synergy of Food and Wine, The Science of Creating and Marketing Wine as Food and 25th Anniversary Annual Meeting. Clarion University Hotel, Ithaca, NY. Symposium is $200/person + meals and ASEV/ES registration is $45-$80 depending on membership type before June 18th. Contact Ellen Harkness, Treasurer ASEV/ES, 765/494-6704 or e-mail **Harkness@foodsci.purdue.edu**

Jul. 20 - University of Kentucky Research and Education Center All-Commodities Field Day, Princeton, KY. Contact Jim Herbeck 270/365-7541.

Sep. 21 - Grapes, Berries, Tree Fruits; Pawpaw Production and Tasting, Kentucky State University Farm, Frankfort, KY. Contact 502/564-5871.

Oct. 28 - Fall Kentucky Vineyard Society Meeting, Louisville area.

Jan. 8-9, 2001 - Annual Fruit and Vegetable Grower Meeting, Holiday Inn North, Lexington, KY. Contact John Strang 606/257-5685.

Kentucky Vineyard Society Summer Meeting sponsored by The Kentucky Vineyard Society and Equus Run Vineyards, Saturday, June 24,2000

(Bring lawn chairs please!)

Eastern Daylight Time

9:00 am	KVS Board of Directors Meeting
10:00	Registration
10:15	Welcome! Cynthia Bohn & Cynthia Hall
10:30	Opening Remarks, Chris Nelson, KVS President
11:15 am	Jim Mansfield, Chair Grape Industry Advisory Committee
12:00 noon	BBQ sandwich lunch buffet
1:15 pm	Dr. Jerry Brown, Univ. of KY Horticulturist
2:00	Dr. Ric Bessin, Univ. of KY Entomologist
2:45	Vineyard Tour
3:30 pm	H & W Vineyard & Winery Equipment Grape Hoe, Sprayer Demonstration

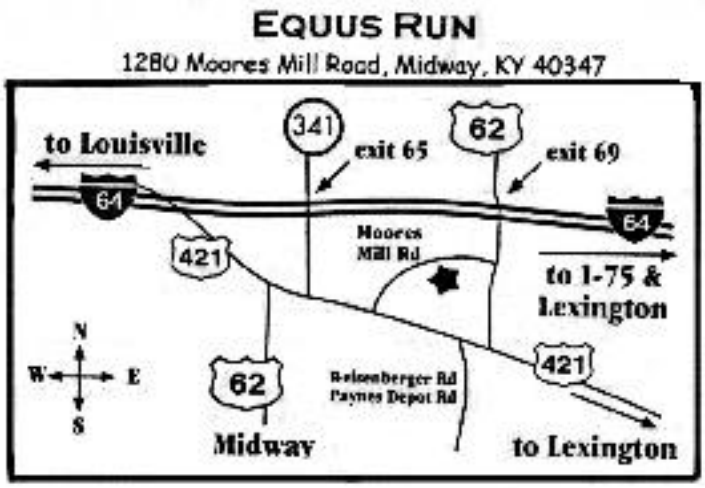
Advance reservations required. RSVP by June 15, 2000

Please make _____ reservations (includes lunch) @ $12.00 each. My check, payable to "KVS" in the amount of $_____ is enclosed.

Signed_____

Return this form to:
Cynthia Bohn, Equus Run Vineyards, 1280 Moores Mill Rd, Midway KY 40347

Late reservations 6/14 to 6/19/00 @ $14.00 each, call 606-846-9463.
No reservations after 6/19/00.



Grape Black Rot and Cane and Leaf Spot Diseases

With the increase in new grape plantings in Kentucky in recent years should come increased recognition of the important diseases facing grapes. Black rot, caused by the fungus *Guignardia bidwellii* is regularly the most devastating disease of commercial and backyard grapes in Kentucky. However, cane and leaf spot caused by the fungus *Phomopsis viticola* can cause serious injury to grapes in some Kentucky vineyards. Grapes grown in areas where a moist environment persists are especially vulnerable to both diseases.

Symptoms - black rot. Black rot symptoms are just beginning to appear on grapes statewide. Leaves are showing the typical circular to angular brown spots, often with tiny black fungal fruiting bodies (pycnidia) arranged in a ring near the outer margin of the spot. Although fruits are now just a little past bloom, they will later show symptoms ranging from small, brown, decayed spots to completely rotted, black, shriveled fruits studded with fungal pycnidia. The fungus also infects tendrils, leaf petioles, and canes. The occasional periods of warm,

humid, rainy weather that we experienced this spring favored infections by the black rot fungus.

Symptoms - cane and leaf spot. Leaf spots appear in early spring as small irregular, light green spots. These spots darken and enlarge to form black-brown lesions. As these lesions become more numerous, they may run together along the veins, forming large dead areas. Infections on new canes appear as reddish spots which later become brown and slightly elongate. Spots may coalesce and form black, irregular, scabby or crusty areas on the canes. Dark, sunken spots may also appear on leaf petioles and fruit cluster stems. The spotted tissue may crack open once the lesions run together. The fruit may also become infected under unusually wet conditions, resulting in fruit rot. The berries become dried and shriveled in appearance. Cane and leaf spot symptoms could be confused with black rot, however black rot tends to form brown, rather than black stem and leaf spots, and black rot leaf lesions tend to be angular and distinct.

Both fungi overwinter in infected canes and in last year's dried, shriveled fruit, called mummies. In the spring, spores are carried by wind and rain with infections occurring during periods of prolonged wet weather.

Disease management. Because these two diseases, especially black rot, are so devastating it is difficult to grow high yields of high-quality grapes in Kentucky without the use of fungicides. For commercial growers, a publication entitled Kentucky Commercial Small Fruit and Grape Spray Guide for 2000 (ID-94), available at County Extension Offices, provides details of fungicides to use. The number of hours of leaf wetness needed for black rot control at various temperatures is known. Some growers reduce fungicide usage in grapes by monitoring weather and using this information to spray based on a predictive system. Homeowners should refer to the Cooperative Extension publication entitled Disease and Insect Control Programs for Homegrown Fruit in Kentucky Including Organic Alternatives (ID-21).

Although fungicides are important for fruit and foliage disease control, many cultural practices should also be implemented for best grape disease control. Consider how shading, weeds, irrigation method and timing, soil drainage, plant spacing, mulch, and disease-free plants will influence the disease situation. In addition, prune and destroy diseased portions of vines and pick off and pick up any mummies left from the previous season. These measures will help to reduce disease and the need for fungicides. (Hartman)

Rednecked Cane Borer Active

Adult rednecked cane borers have emerged and are feeding on blackberries and raspberries. They attack foliage, often feeding on the upper leaf surfaces during the day leaving irregular holes. Larvae feed on and girdle the primocanes which form irregular swellings or galls. Galls are between 1 to 3 inches in length and often split the bark. Adults feed on leaves and the young leaves near the growing point of the primocanes. Rednecked cane borers may infest as much as 50 percent of the canes in one or two years old plantings. Girdled canes are predisposed to winter injury. Two insecticide applications, 7 to 12 days apart, timed to coincide with adult emergence, June through early July, will provide helpful (Bessin)

Disease Control with Strobilurin Fungicides

Growers in Kentucky now have three different broad-spectrum fungicides called strobilurins available for managing diseases of grapes and apples. The fungicide Abound (azoxystrobin) from the Zeneca Company was available for grapes last year for managing black rot, powdery mildew and downy mildew. This year, apple and grape growers have two more strobilurins, Sovran (kresoxim-methyl) from the BASF Company and Flint (trifloxystrobin) from the Novartis Company. Sovran and Flint provide excellent control of apple scab, powdery mildew, sooty blotch, flyspeck, black rot, and some control of cedar apple rust and quince rust, depending on rates used. The new strobilurin chemistry is a welcome addition to the list of fungicides available not only because they are effective, but also because they should help to slow the development of resistance to other fungicides such as the sterol inhibitor (SI) fungicides (e.g. Nova, Procure). Ideally, each fungicide group helps keep the others effective longer.

Origin of strobilurin fungicides. Strobilurin chemistry was derived from a natural anti-fungal compound that occurs in a small mushroom, *Strobilurus tenacellus*, which grows on fallen pine cones in Europe. Chemists in several companies modified the original compound to make it more stable and more effective as a fungicide. The strobilurins are very active against a wide array of plant pathogenic fungi, generally at rates of only one to three ounces of active ingredient per acre. They have very low toxicity to birds, earthworms, beneficial insects, predaceous mites, and mammals (including humans). They break down quickly in soil but have good residual activity on foliage and fruit. Because of their broad spectra of activity and favorable environmental profiles, they are the most significant new group of fungicides to be developed since the SI fungicides.

How strobilurin fungicides work. Unlike the SI fungicides, the strobilurins are excellent inhibitors of spore germination; thus, they are excellent protectant fungicides. These materials are retained primarily within the waxy cuticle of leaves and fruit, which means that they are more rain-fast than traditional protectants. This also means that they don't redistribute very well from leaf to leaf in rainwater, although they do redistribute well within the waxy layers of a given leaf or fruit. Furthermore, a small portion of the total dose does diffuse from the surface of a sprayed leaf and, after a few days, enough accumulates on the other side so that it offers fungicidal protection on that unsprayed side (trans-laminar activity). This general pattern of fungicide movement is unique to the strobilurins, and different manufacturers have devised their own trademarked names to describe it, e.g., "surface systemic" for Sovran and "mesosystemic" for Flint. These terms are used in their advertisements. In addition to being excellent protectant fungicides, the strobilurins are powerful antisporulants. That is, when applied beyond their period of true "kickback" activity, they allow lesions to develop but few secondary spores form on these lesions. This is particularly significant for a disease like apple scab, where economic damage (fruit scab) is usually caused by the secondary spores that develop on infected leaves. In experiments where fungicides were not applied to the first cluster leaves to manage early infection periods, significantly less fruit scab developed when the next two subsequent sprays consisted of a strobilurin rather than an SI plus mancozeb. This reduction in fruit scab was directly related to the reduced number of sporulating lesions produced on cluster leaves treated with strobilurins versus those treated with other materials.

The strong protectant and antisporulant activities of these materials are functions of their retention in the cuticle on the surface of the leaves and fruit. Conversely, good curative or kickback activity usually requires a fungicide to penetrate the cuticle and get inside the leaf, i.e., to get down where the fungus is "doing its business" after it's established an infection. Thus, the strobilurins generally are not as effective in a kickback mode as are compounds with a higher degree of systemic activity, such as the SI fungicides. However, apple scab may provide an exception to this general rule because the apple scab fungus grows just beneath the cuticle, so that enough fungicide to provide true post-infection control may actually "leak through" the underside of the cuticle and do the job. Both Flint and Sovran are labeled to provide approximately 4 days of post-infection control for apple scab. However, it is not clear whether post- infection sprays truly kill the incipient infections or merely keep them from sporulating (in which case, they could potentially reactivate without additional applications of the fungicide). There is no question that Sovran and Flint provide scab control when applied just after infection, but it seems risky to deliberately design post-infection control programs with these materials until more is known.

Used alone, Sovran and Flint will perform in the orchard similarly to tank mixes of SI and contact protectant fungicides. It is important to recognize that these strobilurin fungicides control scab (and many other diseases) on apple fruit at least as effectively as mancozeb and captan, and much more effectively than SI fungicides when applied alone. For strobilurins, spray intervals of greater than 10 or 11 days are not recommended during the primary scab season, due in part to the need to cover new tissues as they emerge.

Fungicide resistance? Strobilurin fungicides work by inhibiting a single biochemical pathway involved in mitochondrial respiration in fungal cells. Mitochondria are the energy-producing units within cells, so disrupting mitochondrial function results in death of the fungal cells as they "run out of gas." Because strobilurins inhibit a single biochemical step, resistant strains of various pathogens will develop if these fungi can utilize an alternative biochemical pathway that bypasses the step blocked by strobilurins. Resistance to strobilurins has already appeared in powdery mildews of cereal grains and cucurbit crops in Europe and Asia, as well as in Botrytis of greenhouse crops. Thus, resistance is a very real concern, and resistance management must be incorporated into plans for using strobilurin fungicides from the beginning.

To date, strobilurin resistance appears to follow the "Benlate model;" that is, resistant isolates are virtually immune to the fungicides and multiply rapidly if they are not controlled by some other material. Furthermore, a fungal strain that is resistant to Sovran or Abound will be resistant to Flint and vice versa. Therefore, the manufacturers have agreed on similar labeling which requires use patterns that incorporate resistance-management principles. Growers must limit the number of times that a strobilurin may be used per season to 4 or 5; and they must not use a strobilurin fungicide more than two or three times in a row. If two applications are made in sequence, an effective unrelated fungicide must be used in the next two applications before strobilurin use can resume.

Note that tank-mix combinations are not a part of this strategy, and that both fungicides are priced to be used alone. Thus, this strategy minimizes the selection of resistant strains by limiting the number of selection events (sprays); and limits the opportunity for resistant strains to multiply, by using unrelated fungicides in rotation. Restricting the number of sequential strobilurin sprays to two might be the more effective anti-resistance strategy, although three is legal. Economics will help enforce the limited-spray strategy, but it is important that growers not deliberately short-circuit the intent to limit the buildup of resistant fungus strains; e.g., by failing to rotate with effective unrelated materials. For instance, rotating Flint or Sovran with only benzimidazole/captan sprays would not be a good resistance-management strategy for powdery mildew, because the mildew fungus is already resistant to the benzimidazoles in many orchards.

Strobilurin use patterns. Growers will need to decide the best times in the season to use the strobilurin fungicides. Be aware that the strobilurin fungicides are strong against scab and powdery mildew, weaker against cedar rusts, and strong against sooty blotch and flyspeck. The best timing for use could be to apply strobilurins twice in spring at around bloom time and again twice in early

summer, using other fungicides very early in spring and in late spring and late summer. There has been little research done to determine the timing of these fungicides for best sooty blotch and flyspeck control.

Strobilurin fungicides can be phytotoxic to some crops. Abound is phytotoxic to certain apples with McIntosh parentage, so it is not registered for apples. Apples sprayed with contaminated sprayers or receiving drift from applications to grapes can also be affected. Sovran is phytotoxic to a few sweet cherry varieties and therefore will not be registered for cherries. Flint is phytotoxic to Concord grapes and is specifically not labeled for use on that variety. Thus,each of these strobilurins has a problem with phytotoxicity to a few varieties of one specific crop. Fruit growers producing apples and stone fruits or apples and grapes may wish to consider the potential for phytotoxicity when selecting which of these fungicides they will use on their farm.

Parts of this report were adapted from an article printed in the Scaffolds fruit newsletter written by Wayne Wilcox and Dave Rosenberger, of Cornell University. (Hartman)

Pesticide Spray Drift - A Critical Issue Every Year

Spray drift is a potential problem almost every time a pesticide application is made. The following information, from the Environmental Protection Agency, provides a good review of something every applicator should know.

The EPA defines pesticide spray drift as the physical movement of a pesticide through air at the time of application or soon thereafter, to any site other than that intended for application (off-target). Its definition does not include movement caused by erosion, migration, volatility, or contaminated soil particles that are windblown after application, unless specifically addressed on a pesticide product label with respect to drift control requirements.

How Does Spray Drift Occur? When pesticide solutions are applied by ground spray equipment or aircraft, droplets are produced by the nozzles of the equipment. Many of these droplets can be so small that they stay suspended in air and are carried by currents until they contact a surface or drop to the ground. A number of factors influence drift including weather conditions, topography, the crop or area being sprayed, application equipment and methods, and decisions by the applicator.

How Does EPA View Off-Target Spray Drift? When labels of pesticide products state that off-target drift is to be avoided or is prohibited, the policy is straightforward: pesticide drift from the target site is to be prevented. However, [the EPA] recognizes that some degree of drift of spray articles will occur from nearly all applications. The question becomes - were all reasonable measures to reduce drift followed?

Applicators must use all available practices designed to prevent drift. They must consider factors such as wind speed (greater than 10 mph), direction and other weather conditions (inversions), application equipment, the proximity of people and sensitive areas, and product label directions in making their decisions. Sprays should not be applied when conditions favor drift or when prohibited by the label requirements. EPA uses its discretion to pursue violations based on the unique facts and circumstances of each drift situation. (Townsend)

Twelve Tips for Applicators

By following this check list, applicators can comply with critical state and federal regulations concerning pesticide use and application.

1. **Know your fields.** Be aware of sensitive areas such as sinkholes, bodies of water, and slopes where runoff can occur and use buffer strips as appropriate.
2. **Always read and follow label directions**. You should read the label every time you get a new shipment of pesticides. Pay close attention to sections on Practical Treatment, Precautionary Statements, Directions for Use, Storage and Disposal, in addition to instructions for the crop you are treating.

Be aware of any label changes. Pesticide labels can change in the middle of a season. It is a violation of state and federal law to use a product in a manner that is inconsistent with its label. Have a copy handy as a reference.

3. **Follow the Worker Protection Standards.** Keep your central posting area up to date. Be sure personal protective equipment is repaired and clean. Have decontamination station equipment ready.
4. **Check your spray equipment** for wear and calibrate carefully. Check hoses and nozzles for wear, especially if you apply a lot of WP, DF, WDG, DF, or F formulations. These are abrasive and wear nozzles. Inspect pumps and pressure gauges.
5. **Use a safe mixing and loading area**. When possible, mixing and loading sites should be at the application site. Also, they should be at least 50 feet from wells, streams, etc. It is best to have a liquid tight mixing and loading pad.
6. **Protect against backsiphoning**. Keep the end of the filler hose above the spray solution in the tank. Backsiphoning can occur when the end of the hose falls below the level of the tank contents and there is a drop in pressure. Leave an air gap between the end of the hose and the spray mix level or use an approved anti-backsiphoning device.
7. **Store pesticides in a safe place.** Store pesticides in the original container with an intact label. Read the

Cooperative Extension Service
U.S. Department of Agriculture
University of Kentucky
College of Agriculture
Lexington, Kentucky 40546

storage instructions on the product label. The storage area should be dry and ventilated, away from animal feeds, and secure. Pesticides must be stored at least 50 feet from any well unless they are in secondary containment.)

8. **Keep accurate pesticide application records.** This must be done for all Restricted Use pesticides but is a good idea for General Use products, too. Accurate records can assist an applicator in the event the product does not perform to expectations. Be aware of the record keeping requirements of the U.S.D.A., Worker Protection Standards, and the groundwater protection act.

9. **Have an emergency response plan** in case of a spill or exposure. Have the proper protective equipment to protect yourself. A shovel and absorbent material can be used to confine small to medium liquid spills. Call 911 to report the spill.

Give the exact location, product involved and the approximate amount. Your decontamination kit should have soap, water, disposable towels and coveralls incase of an exposure.

10. **Dispose of pesticide containers properly.** Remove the lid, triple rinse, and puncture liquid containers and use the KY Department of Agriculture's pesticide container Rinse and Return Program. In the event the program is not available in you county, contact your local extension agent or the Department of Agriculture for the nearest collection point.

11. **Don't spray when it is windy or rain expected**. Drift can be a major and costly problem. Do not spray when the wind speed is 10 mph or more. Use low pressure, low boom placement, and large droplet size, as appropriate. Heavy rainfall can wash off applications during the first several hours. Check the product label for specific guidelines.

12. **Use the proper protective equipment** and good personal hygiene. Follow label requirements for protective clothing. Wash hands following any work with pesticides. Shower at the end of the day and wash work clothing separately from the rest of the family laundry.

Lee Townsend, U.K. Entomology and Ken Franks, Jr. Division of Pesticides, KY Department of Agriculture)

Receiving Fruit Facts Electronically on the Internet

Fruit Facts is available on the web in the pdf format. To get notification of the monthly Fruit Facts posting automatically and approximately two weeks earlier than it would normally be received via mail, you can subscribe to the UK College of Agricultures's Majordomo list processor.

New subscription requests and requests to unsubscribe should be addressed as follows.

To subscribe type "majordomo194@ca.uky.edu"in the To: line of your e-mail message. Please enter a subject in the Subject: line

- the system needs for the Subject line not to be empty (blank).

In the message body, enter the following two lines (nothing more!):

subscribe fruitfacts
end

Or, to unsubscribe, the lines:

unsubscribe fruitfacts
end

You should receive confirmation by return e-mail. If you have a problem, or if you wish to communicate with a person about "fruitfacts", the owner's address (the To: line of the message) is: owner-fruitfacts@ca.uky.edu

John Strang, Extension Horticulturist