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KENTUCKY PEST NEWS

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CORN

BT CORN REFUGES, THEY'RE GOOD FOR YOU

by Ric Bessin

With the level of corn borer damage observed in many fields this fall, there may be considerably more Bt corn planted in 2001. One of the most important considerations will be the use of corn borer refuges on each farm using Bt corn. This is required by the EPA. In Kentucky, the EPA is requiring that each farm using Bt corn have a corn borer refuge that is at least 20% of their corn acreage. This refuge needs to be within 1/4 mile of the Bt corn if the farmer wants to have the option of spraying the refuge for corn borers, or within 1/2 mile if it will not be sprayed for corn borers. Farmers are not permitted to use their neighbor's corn as their corn borer refuge, it must be non-Bt corn on their farm.

A Fistful of Reasons to Use Corn Borer Refuges With Bt Corn?

1. *It's the law*. The EPA posted their corn borer resistance management requirements for Bt corn in Spring 2000. Farmers using Bt corn are required to use this resistance management plan.

2. *It makes economic sense*. There is no way of predicting whether or not corn borers will be an economic problem in any given field next year. So planting a farm with 100 % Bt corn doesn't make sense. Rather, those using Bt corn should target it only for high risk plantings to spread the costs of the technology and risks of corn borer damage over the entire farm. This reduces production costs while managing corn borer losses.

3. *It slows development of corn borer resistance.* Corn borer resistance is a real threat. Insects have the ability to adapt. If corn borer resistance were to develop, farmers in that area would lose the benefits of Bt corn. It is likely that the EPA would restrict the sale of the seed in those areas in following years. The use of corn borer refuges is the only tool that we have to delay or prevent corn borer resistance.

4. *It demonstrates that farmers are responsible stewards.* The farming and non-farming public has not fully accepted Bt corn. There remains some apprehension by the public about this technology. Complying with the Bt corn refuge guidelines demonstrates that farmers will use this technology responsibly rather than exploit it for short term gains.

5. *It provides a comparison for the Bt corn?* If the non-Bt corn refuge is planted with an appropriate hybrid, then the yield per acre and level of insect damage can be compared to the Bt corn. Over time this will provide the basis for decision making to determine the most economic mixture of Bt and non-Bt corn on the farm. Without this comparison, farmers may not be able to measure the real value of Bt corn on their farm.

STALK ROTS AND BT CORN
by Paul Vincelli

Corn fields in a number of locations throughout Kentucky have experienced moderate to severe lodging problems below the ear. The worst case I've seen was a field where 95% of the stalks were lodged. Based on my observations and those of others, stalk rot diseases have been a significant factor in many of these cases. Gibberella stalk rot has been the primary disease we have identified in samples analyzed in the UK Diagnostic Labs, although it is possible in most of these fields to also find individual stalks with, in order of decreasing frequency: Diplodia stalk rot, Fusarium stalk rot, and anthracnose stalk rot.

Stalk-boring insects–especially southwestern corn borer--can cause lodging of lower stalks, so some of the stalk lodging can be attributed to stalk borers. However, in the cases I have scouted with more than 15-20% lodging, most of the damage was not related to insect damage.

This is an important point for producers wishing to minimize stalk lodging problems in future years. Some producers have observed good stalk quality in certain Bt hybrids. However, this does not mean that the Bt trait itself is responsible. I visited a field three weeks ago that had a side-by-side planting of a Bt hybrid and a non-Bt hybrid, and although lodging appeared to be more noticeable in the non-Bt hybrid, that hybrid was also reported in the seed company's catalog as having lower ratings for stalk strength and root strength than the particular Bt hybrid that was used in that field. In other words, the better stalk quality in the Bt hybrid was not due to the Bt trait–it was due to other genetic factors associated with that particular hybrid.

A striking example of how the Bt trait was not directly linked to reduced lodging in numerous fields this year was seen in a variety trial conducted by Wayne Mattingly, Extension Agent in Daviess County. Dr. Lisa Vaillancourt, a UK stalk rot researcher, and I visited the field three weeks ago and collected data (not far ahead of the combine, I might add...). Below are selected data for three hybrids.

Hybrid[a]	Bt trait present?	% stalks lodged below ear	% of lodged stalks with lodging at insect feeding site
Pioneer 31B13	yes	60 $\pm$ 13 %	8%
Asgrow RX748TC	no	12 $\pm$ 8 %	70%

[a]Side-by-side, unreplicated strip plots. Samples were taken at random at numerous locations within plots.

These data show that the Bt hybrid (Pioneer 31B13) suffered severe stalk lodging, among the worst in this trial. Most of the stalks in this hybrid were lodged at sites with no insect tunneling, so the Bt trait did not provide protection in this hybrid against the primary cause of lodging that occurred at this site. (It is worth noting that an incidence of 5% stalks with tunneling is not unusual for this hybrid in spite of the Bt trait, according to Ric Bessin, UK Extension entomologist). In a non-Bt hybrid (Asgrow RX748TC), although the majority of lodged stalks were broken in sites of insect damage, the overall level of stalk lodging was much lower. These data suggest that factors other than insect damage were responsible for most of the lodging that took place in this site. This is consistent with other sites I have visited and samples I have inspected in the Diagnostic Lab.

The research I've seen to date suggests that, in the Midwest, the relationship between insect damage and stalk rots is not clear-cut. In Iowa, fields that experienced considerable predisposing stress and little insect damage exhibited stalk rot equally in Bt and non-Bt hybrids. In an experiment in Nebraska, no differences in stalk rot were seen between Bt and non-Bt hybrids. However, in an experiment in Iowa where European stalk borer populations were moderate to high, significantly less stalk rot (primarily Gibberella) occurred in the Bt hybrids, and the effect differed among Bt events.

Thus, while the use of Bt hybrids might improve stalk quality in certain situations, especially late-planted fields with substantial insect pressure, it is not the solution to the stalk rot problems I've seen this year.

Although weather-related factors have played a role in the stalk-rot problems observed, producers should consider the following factors known to enhance stalk rots: excessive plant population, excessive N in relation to potash, high N levels early in the season followed by N loss through leaching or denitrification, inadequate levels of

potash, low stalk strength ratings of hybrids planted, and severe leaf disease (including common rust and gray leaf spot).

SOYBEANS

NEW INSECT PEST OF SOYBEAN IN KENTUCKY

Doug Johnson, Extension Entomologist

During late summer of 2000, soybean producers in the north central states discovered that some late-planted soybean fields were infested with an aphid that they did not recognize. Subsequent investigation revealed that these insects were the soybean aphid, *Aphis glycines* Matsumura. Previously unknown in the US, this pest can be found from Australia to the Russian Far East. Soybean losses caused by it are most serious in SE Asia, from the equator to 15 °N. In this part of Asia, as in our area, determinate soybean varieties are primarily grown. Reports in the far east indicate that this aphid can reduce soybean yields from 20% to 40%.

The known Kentucky distribution of *Aphis glycines* is currently represented by collections from Hardin, Fayette, and Fulton counties. However, all the river counties in Indiana and several in Illinois were infested, so it appears from locations of these counties that the aphid is likely to be found in much of Kentucky's soybean growing area.

At this point the aphid has appeared only in very small numbers. We will need to do some survey work during the next growing season to determine the extent of this pest in our state. Most of the north central states will also be looking for the pest and I hope to design a survey protocol that will be complimentary to our sister states. This pest is likely to move over the entire area every year, and may very well require cooperative approach to understand and combat it. Because of the complex biology of this pest, getting a solid handle on distribution and abundance, and thus risk, may take several years.

The known distribution of infestation is Kentucky, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio and Wisconsin. In all of these states, the populations were very small with just a few exceptions in Wisconsin. The best guess is that the aphids came in from the far east in the last year or two on potted plants. However, neither of these assumptions has been proven.

I have some color photos of this pest and associated crop damage on order. As soon as they arrive they will be placed on our web site. Until then you can go to an Australian site to look at the little buggers.

www.agric.nsw.gov.au/Hort/ascu/insects/aglycin.htm

This aphid has a complex life cycle which requires two different types of plants. The sexual stage is completed on what is called the primary host, which in our case is not a crop. These plants are small trees or shrubs known as "buckthorn". The primary host in the far east, *Rhamnus dahurica*, is apparently not known to occur in Kentucky. However, a quick perusal of local information indicates that at least three species of the buckthorn genus, Carolina buckthorn, *R. caroliniana*, Lance-leaf buckthorn, *R. lanceolata* and Common buckthorn (a.k.a.Buckberry), *R. cathartica* are present in Kentucky. Very recently Common buckthorn has show the ability to serve as the primary host . (D. Voegtlin personal communication).

The secondary host, or those plants on which asexual reproduction occurs, are what we are interested in. The most important of these is soybean. The two known alternate secondary hosts, *Pueraria javanaca* and *Desmodium intortum*, are also not known to occur in Kentucky. However, *P. lobata*, Kudzu, is found in Kentucky's southern tier of counties throughout the soybean production area and in many parts of eastern Kentucky. Species of *Desmodium* (beggar weed, tick weed, etc.) are generally found in the soybean growing region of the state (J. R. Martin, personal communication). Knowledge of these plants will be important because they will largely determine whether or not the aphid can overwinter in Kentucky. The primary host is probably going to be required for over-wintering because the secondary hosts go dormant in the winter. Although it seems odd, with any luck this pest may have to overwinter much further north on the primary host or way south on a secondary host. (Right now the aphid is not known to occur further south than Kentucky.)

In addition to direct feeding damage, several viruses are transmitted by A. glycines. Bean yellow mosaic virus is one known to be important in Kentucky (D. E. Hershman, personal communication) and there as it becomes available through the winter.may be several others.

The soybean aphid has not caused us any problems thus far. However, the potential for any introduced pest is usually quite high. Individuals in the Departments of Entomology and Plant Pathology are in communication with our colleagues in the infested and surrounding states to keep and eye on this pest and to learn what we can about its dangers as soon as possible. Without doubt we will be looking for help in our efforts to study this pest over the next growing season. Additional information will be provide

LIVESTOCK

HORSE BOTS
By Lee Townsend

The first hard frost or two in the fall finishes off some insects and end the potential for infestation until next spring. Horse bots fall into this category. They are honey bee-sized flies that dart around and glue their tiny eggs or nits to body hairs of horses, donkeys and mules. The fast movements of these flies can frighten animals. Horses also can injury themselves as they attempt to relieve the irritation from burrowing activities of newly hatched bots. In addition, most of the larval or bot stage of the fly is spent as an internal parasite where it can cause serious problems.

There are three species of horse bots. Their life cycles essentially vary only in where they attach their yellow to gray eggs to the host. Common horse bot eggs most often are attached to hairs on the fore legs but can be found on the outside of the legs, the mane and on the flanks. Throat bot eggs are attached to the long hairs beneath the jaws. Nose bot eggs are stuck to hairs on the upper and lower lips. It is easy to see how horses can be spooked by flies buzzing at these areas and may injure themselves or people working or riding them at the time. Depending on the species, females deposit from a few hundred to 1,000 eggs during their life time.

Bot eggs hatch after a 2- to 5-day incubation period, often stimulated by warmth and moisture from the animal's tongue. Newly hatched bot larvae enter or are taken into the mouth. They spend about 3 weeks in soft tissue of the lips, gums, or tongue. The bots then migrate to the stomach or small intestine where they use sharp mouth hooks to attach to the lining of the organ. Bots can damage the lining of the stomach or small intestine, interfere with the passage of food, or cause other gastrointestinal disorders. They spend about 7 months there before passing out in the feces. The mature larvae enter the soil below the dung pile and pupate. In 2 weeks to 2 months, depending upon the season, they emerge as adults.

The adults do not have functional mouthparts so they cannot feed. Females go to horses only to lay their eggs. Most of the egg- laying is done during August and September. A hard frost is needed to assure the end of fly season each year.

While bot flies may or may not be noticed around horses, it is easy to look for nits, or eggs, on the animal's coat. Virtually all horses in Kentucky are likely to be infested. Most of the pest life cycle occurs in the horse. Consequently, an insecticide, applied internally, is necessary to provide effective control. Check product labels carefully, all equine deworming drugs do not necessarily affect horse bots. Before purchasing any product, read the pest list on the label and note any precautions regarding product use.

Trichlorfon, an organophosphate insecticide, is available by itself (Combot) or included in some combination dewormers to provide bot control. No other organophosphate or cholinesterase inhibiting products, such as those containing dichlorvos (Vapona), coumaphos (Co-Ral), or tetrachlorvinphos (Rabon) should be applied to horses at the same time, or within several days of treatment. The product label will give specific restrictions. Ivermectrin, the active ingredient in products such as Eqvalan, Zimectrin, and Protectin 1, controls bots and other internal parasites but is not a cholinesterase inhibitor. No supplementary bot control material is needed when using products that have ivomectrin as the active ingredient. Consult your veterinarian about an appropriate parasite control program.

SHADE TREES & ORNAMENTALS

WILD MUSHROOMS— TO EAT OR NOT TO EAT?
by John Hartman

That is the question. It is one we frequently hear in fall, especially this fall, with its extended pleasant weather following a moist growing season. Mushrooms grow and fruit in fields, forests and landscapes throughout Kentucky almost any time of year, but fall is an especially good time to see a diverse number of these common, often ephemeral life forms. As we savor or labor in our landscapes or hike through forests and fields enjoying the fall colors, a great variety of mushrooms can be seen growing on the ground, in landscape mulch, in the duff on the forest floor, or out in the open meadow. They are also commonly seen on decaying logs, dead branches, and even on live trees. For many people, there is a great temptation to gather and eat these fruiting bodies of fungi that we call mushrooms, toadstools, brackets, or conks.

The most frequent answer we give to the question is no, do not eat wild mushrooms! Most of us do not have sufficient expertise to tell the poisonous ones from the edible mushrooms. Even when a sample is submitted to the plant disease diagnostic laboratory and those of us in the lab are pretty sure of the mushroom's identity and that it is edible, we still say no. Who knows if the specimen we examined is the same as, or is representative of what the mushroom hunter is gathering and eating? Similarly, we suggest that County Extension Agents giving advice to mushroom hunters just say no when it comes to fungal edibility.

Fungi which form mushroom-like fruiting bodies are a diverse group of organisms that grow mostly as saprophytes, but sometimes as parasites or as symbionts. As saprophytes, fungi are sometimes regarded as the vultures of the plant world, scavenging on already dead plant material and breaking the complex plant structures into humus, thus recycling dead plants into the soil for future use. For most of their lives, mushroom fungi grow as fine threads of hyphae throughout the decaying vegetable matter, wood, or sometimes the live tree that is their home. With the need to reproduce and spread spores for new colonization of the fungus, these organisms produce interesting mushrooms which are sometimes tasty and sometimes deadly poisonous. Mushrooms do not need to be eaten - they can be simply enjoyed for their beauty and diversity.

In the landscape, mulch, especially wood chips used as a ground cover or to protect trees, is a good substrate for a variety of mushrooms. But mushrooms can emerge out of the lawn or even the driveway in the absence of visible decaying vegetable matter. In such cases, the fungi are growing on decaying wood or dead tree roots buried in the ground. Some mushrooms such as mycorrhizal fungi growing in the lawn are symbiotic with live roots, the symbiosis benefitting both the fungus and the tree. Still others growing from the roots, the base of the tree trunk, or even up on the trunk and limbs may be parasites in the process of killing their host.

Mushrooms with typical stalks and caps are often found growing in the lawn, sometimes in circles called fairy rings. Also sometimes referred to as toadstools, these fungi also grow from buried organic material such as a decaying root. Other mushrooms such as the shoestring root rot fungus grow at the base of trees infected with root and butt rot. Another fungus, called the dead man's fingers, grows as hard, black projections resembling a mummified hand from the roots of live trees in the lawn. The dead man's fingers fungus also causes root rot disease. And yes, some toadstools are so tough they push their fruiting bodies right up through an asphalt driveway. Growing on wood or organic material buried beneath the drive, in their struggle for survival they can damage property. In the meadow, giant puffballs are among the most spectacular of mushrooms. These white spheres, often baseball-sized, may grow to the size of a basketball. Mature puffballs will emit a cloud of powdery brown spores through an opening in the top when prodded. If this mushroom is harvested early, when the flesh is still white, it is edible. In the forest one can observe everything from large, rigid conks on trees to petite little fungi resembling tiny parasols or teacups growing on the humus of the forest floor.

Thus, mushrooms are an important part of the awe and wonder of nature that is present in the wild and even in our own yards. They are mostly helpful in the natural scheme of things, keeping dead plant material from accumulating to intolerable levels. Although some mushrooms can be eaten, mushrooms can also be enjoyed just for being fungi - for their uniqueness, variety, and unusual life habits.

If mushrooms are to be eaten, mushroom hunters must know for sure which species they are preparing because both poisonous and non-poisonous species can closely resemble on another. Consult with experts who have experience in identifying edible mushrooms. One can learn from experts who organize mushroom forays such as that held at Natural Bridge State Park each fall. There are also numerous books on mushroom identification such as: *Mushrooms of North America* by Orson K. Miller, Jr., *Mushrooms and Other Fungi of Land Between the Lakes* by W. J. Sundberg and J. A. Richardson, *Introduction to Mushroom Hunting* by V. K. Charles, *Audubon Society Field guide to North American Mushrooms* by G. H. Lincoff, and *Common Fleshy Fungi* by C. M. Christensen.

LUMINESCENT FUNGI?
by John Hartman

We sometimes get calls this time of year from people who observe a glowing in the night, of what appears to be a smoldering fire in a nearby brush pile or from the roots of uprooted trees. Because this is the fire season in Kentucky's forests, we need to take seriously any smoldering of trees in the woods, but in some cases observers are seeing the glow of luminescent fungi growing on rotten wood. A phenomenon which interested and mystified our ancestors was the fluorescence which they observed in woods and forests when old stumps sometimes appeared to be burning or smoldering. Some of the following accounts of luminescent fungi are described more fully in a book called *Fungi Folklore, Fiction, & Fact* by W.P.K. Findlay, a British mycologist.

The epic saga of *Beowulf* alludes to this fluorescence or bioluminescence when describing a particularly ominous place. "It is not far from here - if measured in miles, that the lake stands - shadowed by trees stiff with hoar-frost. - A wood, firmly rooted frowns over the water. - There, night after night, a fearful wonder may be seen - fire on the water...That is not a pleasant place." The "fire on the water" most likely refers to a luminescence from fungi on rotten trees growing in a swamp.

That decaying wood is often luminous had been known since classical times. Sir Francis Bacon first systematically studied luminous wood. He found

that only decayed wood shone and he proved that the glow was more intense when the wood was moist, a condition that favored wood decay disease. However, it was not until the middle of the nineteenth century that the light was recognized as coming from the actual threads of the fungus that grew on it. The color of the light emitted by fungi varies from white to greenish or bluish white. Sometimes the radiation is said to pass through opaque materials. The luminosity that has sometimes been observed among fallen leaves in the autumn has been found to be due to growths of small bell-shaped toadstools, one of which has the charming scientific name of *Mycena tintinnabulum*. Cultures of this fungus may glow for 15-20 days.

The rhizomorphs of *Armillaria mellea*, the honey fungus which causes tree root and butt rot, is also known to glow, especially at its growing point. A few years ago, on a fall mycological foray to Natural Bridge State Park, we saw *Panellus stipticus*, one of many wood decay fungi also referred to as foxfire fungi. Mark Twain, in *The Adventures of Huckleberry Finn* mentions "rotten chunks that's called 'Foxfire' that just makes a soft kind of glow when you lay them in a dark place." In the tropics, girls are said to attach foxfire to their hair when dancing at night. Tropical natives were known to attach luminous fungi to their bodies so that explorers being guided through the forest would not get lost.

Soldiers in the trenches during World War I affixed glowing rotted wood to their helmets so they could see each other in the dark. Woodmen and forest workers in the far north used glowing rotted wood to light their path through the forest, and farmers used glowing rotted wood on long, dark winter nights as a safety lamp rather than use a torch in their highly combustible hay barn. Thus, the mystifying luminous fungi, cause of wood decay, a common plant disease, have had many and varied uses.

GENERAL PESTS

RED IMPORTED FIRE ANT INFESTATIONS FOUND IN KENTUCKY
By Lee Townsend and Doug Johnson

An alert homeowner in McCracken county and an alert pest control operator in Calloway county independently discovered and reported small colonies of red imported fire ants in mid- and late October. These two apparently unrelated incidents are the first records of this insect in the Commonwealth. This is well outside the known range of infestation of this important insect.

The Kentucky colonies have been active for an unknown but apparently rather short period of time. Inspection around the sites revealed no additional mounds but more surveys will be made. Treatments have been applied and the mounds will be monitored and retreated as necessary to eradicate them.

The closest known established infestations of this fire ant are in Tennessee counties which share borders with Mississippi, Alabama, or Georgia. There have been finds scattered across central Tennessee over the past few years, including Henry Co. TN, which is directly across the state line from Murray. These areas are listed as eradication underway.

Infested areas are under a federal quarantine because these insects are transported easily in soil, nursery stock, grass sod, and equipment that can carry soil.

MULTICOLORED ASIAN LADY BEETLES ACTIVE THIS FALL
By Lee Townsend

Flight of the multicolored Asian lady beetles is heavy in many areas this fall and up from last fall in most areas. As usual, it began abruptly in early to mid-October (depending on your location in the state. ENT - 64, Asian Lady Beetle Infestations of Structures, is still the most up-to-date information that we have. Copies are available at your county extension office.

Where did these lady beetles come from?
Their presence in the state is a result of natural spread. The first sighting in KY was in Hickman County in 1992, these lady beetles now occur over the entire state. They were not introduced by UK, nor by any other agency in the state. Lady beetles are not being actively dispensed from helicopters, airplanes, trucks, or any other means.

How long will this last?
Lady beetle flight will continue until the temperatures drop and remain below 50^0 F or so.

What products can I use?
We have recommended synthetic pyrethroid insecticides for their relatively long residual and quick knock down effect. Products such as Ortho Home Defense Indoor & Outdoor Insect Killer 5 and Spectracide® Bug StopTM Indoor & Outdoor Home Insect Control can be used to reduce accumulations of these insects around outside windows and doors (usually on south or west-facing sides of houses or buildings). The idea is to knock down numbers so that fewer have a chance to enter the home.

"I have sprayed these (or other) products directly on the beetles and it doesn't kill them."

The hard wing covers of the beetles protect them from direct sprays. They need to crawl over a treated surface so that the insecticide can be absorbed through their feet. Most beetles will not fall down dead at the first blast of an aerosol. More beetles flying in tend to obscure any gains that have been made in reducing their numbers.

Indoor management is best accomplished by vacuuming or sweeping and discarding invaders. While this seems to be ineffectual and "low tech", it is much better than intensive use of insecticides indoors.

Other useful pubs - ENTFACT 641 - How to pest proof your home - sealing entry ways - these beetles cannot be totally sealed out but some major entry ways could be blocked.

ENTFACT 643 - Indoor foggers. These are favorites but are not very effective against many pests, including this beetle. In fact they are dangerous - see the part about pilot lights.

PESTICIDE NEWS AND VIEWS

IR-4 PROGRAM—NATIONAL PROGRAM PROVIDING PEST MANAGEMENT SOLUTIONS FOR MINOR-USE CROPS

By William Nesmith

With Election Day nearing, it is easy to get a "belly full" of politics and government, with the nature of modern day campaigning. However, this is also a time of year when we can learn where government monies are spent and how they impact our society. As Kentucky's Liaison to one of our national agricultural programs, I would like to review what it is doing. That program is officially named: Interregional Research Project Number Four (IR-4), the National Agricultural Program to Clear Pesticides and Biological Pest Control Agents for Minor Uses.

The IR-4 program has been in existence since 1963 to help provide the registration of safe pest control solutions to growers of minor crops. Minor crops include fruits, vegetables, nuts, herbs, nursery plants, and ornamentals (floral, tree, and turf crops). Minor crops make up about 40% of the total crop value at the farm gate in the US. Minor crops are important to our state and regional agricultural economy. Moreover, these crops are very important in our diets and living environments, and the American consumer demands high quality with them .

To meet these high quality standards, pest control is a major factor in the production of most minor crops. Pesticides are a key tool in their pest management. However, because many of these crops are eaten directly or handled directly by the consumer, pesticide use must be very carefully considered. Despite the high value of minor crops, the acreage planted of any particular crop is low when compared to the major crops, so the market size for any particular use is usually small. Testing costs are high and there are high liability risks for crop injury. Consequently, there is frequently insufficient financial incentive, for the agrochemical industry to invest in the registration of pesticides for use with these minor crops. Bottom line, the manufacturer of the pest control agent is unable to label the product.

Help with this problem, comes from one of our federal programs, administered through the USDA. The IR-4 program is a cooperative effort between the USDA, the Land Grant Universities, EPA, the agrochemical industry, grower groups, food processors, and consumers. Without this program, it is anticipated that the American consumer and the overseas markets would face higher prices, lower quality, and lower quantities of minor crops. Most pesticides registered for use on minor corps in recent years have come through this program. In the last two years, this program has resulted in about 800 registrations, with over half involving "reduced-risk pesticides as replacement for other control options. Kentucky's growers are using those products, as are growers nationally. Without the IR-4 program, the consequences would likely have been that most of these products would not have been labeled. Also, higher production costs for these minor crops would probably have resulted, along with lower quality and quantity, which would also mean higher consumer costs for fruits and vegetables. This would directly impact the competitiveness of US producers, local and overseas markets. Moreover, it would probably impact local
consumption of minor crops, at a time when health experts are urging us to increase the amount of fruits and vegetables in our diets.

UK INTERNET SITES FOR PESTICIDE APPLICATOR TRAINING AND INTEGRATED PEST MANAGEMENT

Pesticide Applicator Training- Maintained by the Entomology department, this site is a continuous source of training information. Dates and locations of approved initial and continuing education meetings for commercial applicators which have been approved by the Division of Pesticides are posted regularly. One listing contains meetings in the state or close by. A second list contains national meetings. This site also provides access to publications and training manuals. www.uky.edu/Agriculture/PAT/welcome.ht

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Integrated Pest Management- Maintained by the Entomology department, this page has information on the program in Kentucky along with on line scouting information and fact sheets.
www.uky.edu/Agriculture/IPM/ipm.htm

UK College of Agriculture- This site has links to all departments and programs in the College. http://www.ca.uky.edu/

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