

THE FIREFLY

Proceedings of the 1997 (Twenty-Fourth)
Annual Meeting of the
Tennessee Entomological Society



October 16-17, 1997
Ramada Inn Governor's House & Conference Center
737 Harding Place (I-65, Harding Place & Trousdale)
Nashville, Tennessee

Volume Twelve

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RICHARD E. CARON

OUTSTANDING ENTOMOLOGIST AWARD

NOMINATION FORM

The Awards Committee of the Tennessee Entomological Society invites nominations from any TES member for the Richard E. Caron Outstanding Entomologist Award. The award is awarded periodically to TES members who have distinguished themselves by making outstanding contributions to entomology in Tennessee.

Name of Nominee _____

Brief Description of His/Her Qualifications for the Award

Name of Nominator _____

Phone Number of Nominee: Area Code () _____

Please submit your nomination by **August 1, 1999** to:

Dr. Steve Hamilton
Department of Biology
Austin Peay State University
Clarksville, TN 37044
FAX (931) 648-5996
hamiltonsw@apsu.edu

**PROCEEDINGS OF THE TWENTY-FOURTH
ANNUAL MEETING
OCTOBER 16-17, 1997**

**Ramada Inn Governor's House and Conference Center
Nashville, Tennessee**

**THE PERIODICAL CICADAS:
THE PLAGUE AND THE PUZZLE**

**Dr. Gene Kritsky
Department of Biology
College of Mount St. Joseph
Cincinnati, OH 45233**

Periodical cicadas, or incorrectly called locusts, were the first insects to capture the attention of the pilgrims in Plymouth Colony, following an emergence in 1633. That first recorded emergence was accompanied by a prediction from Native Americans that a plague would follow the next year.

The early interest in the cicada plague subsided as their natural history was studied. Now we are concerned with the evolutionary puzzle of the periodical cicadas. Three species are currently recognized by their unique morphologies and songs. The three species also have two different life cycles of 17 or 13 years. The 17-year cicadas are more common in the north and eastern portions of the United States, whereas the 13-year cicadas are more common along the Mississippi River Valley. The allochronic populations have been divided into year classes called broods. There are twelve 17-year broods and three 13-year broods. Tennessee has populations of Broods X, XIV, XIX, and XXIII and in 1998, brood XIX will emerge in parts of Central Tennessee.

BENEFICIAL ARTHROPOD POPULATIONS IN TRANSGENIC AND CONVENTIONAL COTTONS

Nancy B. Van Tol and Gary L. Lentz
Department of Entomology and Plant Pathology
The University of TN, West Tennessee Experiment Station, Jackson, TN

Cotton, *Gossypium hirsutum* L., is a major commodity in the United States. In 1996, approximately 540,000 acres were grown in Tennessee. Cash receipts in the state for lint and cottonseed totaled over \$285,000,000, while the cost of insect management and yield losses to insect damage totaled \$22,000,414. The production of cotton has utilized more insecticide than any other single crop in the United States since 1950. The heavy use of insecticides to control cotton pests has increased selection pressure for resistant strains of many cotton insect pests. The tobacco budworm (TBW), a primary cotton pest, has developed resistance to most of the major classes of insecticides used today.

In 1996, transgenic Bt cotton, developed to control the primary Lepidopteran pests of cotton, the TBW, bollworm (BW), and pink bollworm, was made commercially available to cotton producers. Transgenic Bt cotton contains the gene, CryIA(c), from the naturally occurring soil bacterium *Bacillus thuringiensis* ssp. *kurstaki*. This protein is found in all cells of the cotton plant and is highly toxic to caterpillars. Once the insect ingests plant tissue, the Bt protein ruptures the cells of the insect stomach wall causing paralysis of the muscles, cessation of feeding and death of the insect.

The use of transgenic cotton may impact other arthropods in cotton systems. Decreased use of insecticides for control of Lepidopteran pests may increase the number of beneficial arthropods, further reducing the need for insecticides to control pests not affected by Bt. It is not yet known whether the reduction in Lepidopteran prey will affect natural enemy populations. Some of the pests not targeted by Bt are considered to be secondary pests. These include aphids, thrips, plant bugs, some armyworms, stinkbugs, white flies and spider mites. It is theorized that pests not controlled by Bt will increase in number, possible to primary pest status as a result of the reduction insecticide sprays.

Research was conducted in the summer of 1996 and 1997 on large field plots at Ames Plantation to compare beneficial arthropod populations in Bt and conventional cotton systems. The objectives of this research were to: 1) determine any differences in the relative numbers of beneficial arthropods in transgenic Bt and conventional cotton, and 2) compare the abundance of mid- to late-season insect pests in the two systems.

Sweep sample data from 1996 and 1997 indicate there were no differences in the number of beneficial arthropods or secondary pests, specifically plant bugs, aphids, and stinkbugs, collected in two systems. In 1996, boll weevil populations reached economic threshold levels. Both cotton varieties received 6 insecticide applications during the sampling period. The most abundant predators collected in 1996 were adult lady beetles and spiders. The seasonal mean of all arthropods was 27/100 sweeps. Boll weevil numbers exceeded economic threshold levels in 1997 and an insect growth regulator (IGR), diflubenzuron, was applied to inhibit oviposition of the weevil while conserving natural enemies. Four applications of the IGR were made during the sampling period.

Arthropod numbers were greatest during peak squaring, the week of July 15, and began to decline until August 22 when numbers increased as the crop matured. The seasonal mean of all arthropods collected in 1997 was 68/100 sweeps, an increase of 60.3% when compared to 1996. Adult big-eyed bugs and spiders were found in the greatest numbers. The data from 1996 and 1997 indicate there are no differences in numbers of secondary pests and beneficial arthropods in transgenic cotton compared to conventional cotton..

VOLTINISM AND THE SPECIES BOUNDARY OF THE SOUTHWESTERN CORN BORER, *DIATRAEA GRANDIOSELLA* DYAR (LEPIDOPTERA: PYRALIDAE)

Steven J. Baskauf
Department of Biology
Vanderbilt University, Nashville, TN

Previous workers have suggested that winter mortality caused by low temperature is responsible for limiting the northward expansion of the southwestern corn borer (SWCB). However, my studies determining cold hardiness of dry larvae, maize root crown temperatures in the field, and the stability of the northern boundary (determined by pheromone trapping) following a moderately severe winter suggest that winter mortality may not be limiting in most years. Similarly, the species' boundary does not correlate with any mean January isotherm, as might be expected if winter mortality were the primary limitation, but instead follows a mean July isotherm between 24 and 27°C. This suggests that the location of the northern boundary is determined by limitation of degree-days which constrain the development of the SWCB during the summer. This is supported by small but significant differences in developmental rate between a population at the edge and a population at the center of the range.

SURVIVABILITY OF CONIDIA OF *DISCULA* *DESTRUCTIVA* IN INSECT FRASS

B. Hed, M. T. Windham, and J. F. Grant
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville, TN 37901-1071

Dogwood anthracnose is caused by a fungal pathogen, *Discula destructiva* Redlin. First reported on flowering dogwood in the New York City area in the late 1970s, it has spread rapidly, devastating native dogwood stands. The role that insects may play in the dissemination of *D. destructiva* was examined. Our objectives were to: 1) develop a nonlethal method of surface disinfecting adult convergent lady beetles (CLBs), *Hippodamia convergens* Guerin-Meneville, 2) determine the length of time CLBs can pass viable conidia in frass and 3) determine (in a greenhouse inoculation chamber)

whether surface disinfested CLBs can inoculate healthy dogwood leaves by depositing conidia of *D. destructiva* in frass.

Surface disinfestation: Beetles infested with conidia were stirred in a solution of 10% Clorox and 5% ethanol for different lengths of time (15, 30, 45, and 60 sec., and 2 and 5 min.), and then rinsed in sterile water for 15 sec. One ml aliquots of the wash water were plated on petri dishes of potato dextrose agar (PDA) and observed for bacterial and fungal contamination. The 5 minute duration yielded consistently clean wash water while beetle survival remained above 50%, and was used in all subsequent experiments.

Conidial viability and time trial: Beetles exposed to conidia of *D. destructiva* were surface disinfested and moved to clean petri dishes for intervals of 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, 12-18, 18-24, 24-36, and 36-48 hours, and 2-3, 3-4, and 4-5 days. *Discula destructiva* was isolated from frass from every interval up to 2-3 days after ingestion. Frass from infested/disinfested beetles and from noninfested/disinfested beetles was collected for intervals 0-2, 2-4, 4-6, 6-8, 8-10, and 10-12 hours after disinfestation and prepared for scanning electron microscopy. Photomicrographs will be presented at the meeting.

Greenhouse experiment: Ten potted flowering dogwood seedlings were placed in a greenhouse inoculation chamber where 100% humidity and temperatures ranging from 11-25 C were maintained under 90% shade cloth. Each tree received four different treatments, on each of four branches. Two isolates of *D. destructiva* were used, one from Winchester, TN and one from Signal Mountain, TN. Treatment 1 was no beetles, treatment 2 included beetles that had not been exposed to fungal cultures, treatment 3 included beetles exposed to *Discula* cultures, and treatment 4 included beetles that had been exposed to *Discula* cultures and then surface disinfested with Clorox. Beetles remained on treatments 2, 3 and 4 for 24 hours. All treatments were covered with clear plastic bags for 4 weeks. *Discula destructiva* was reisolated from 60% of treatments 3 and 4 using the "Winchester" isolate. *Discula destructiva* could not be isolated from any of the "Signal Mountain" treatments or any of the controls.

These results suggest that conidia of *D. destructiva* can survive passage through an insect gut, and be deposited in frass up to 2 days after ingestion.

TIGER HUNTING IN TENNESSEE (DIPTERA: CULICIDAE: *Aedes albopictus*)

James P. Moore
Department of Biology, Austin Peay State University
Clarksville, TN 37044

A survey of Tennessee's 95 counties was conducted to determine the presence of *Aedes albopictus*, the Asian tiger mosquito. This survey, primarily of tire habitats, established the first record of *Aedes albopictus* in 87 Tennessee counties and confirmed the continued presence of the species in 8 counties with previously reported infestations. Mosquitoes of twelve different species or species complexes were collected during the period July to October 1997. Fifty-one percent of

the larval collection sites yielded *Aedes albopictus* as the only culicid inhabitant. *Aedes albopictus* shared the habitat with other species of mosquito in 31 percent of the larval collection sites. *Aedes albopictus* and *Aedes triseriatus* were cohabitants of only 6 percent of the larval collection sites. No specimens of *Aedes aegypti* were observed. Despite an expected photoperiod-induced egg diapause at <13.5 hours daylight, hatches of *Aedes albopictus* larvae were observed at 11.8 hours daylight in Montgomery County, Tennessee. Many questions yet remain regarding the dispersal, distribution, and potential for disease transmission in North America.

THE BIOLOGICAL MECHANISM OF RESISTANCE OF SELECTED *NICOTIANA TABACUM* TO *MYZUS NICOTIANAGE*

J. Peter Obenauer and C. D. Pless
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

There are several major pests that pose serious threats to tobacco in the Southeast. One of the more important pests is the tobacco aphid, *Myzus nicotianae*. When not properly controlled the aphid can reduce a crop value by 10%, to as much as 25%. During the past five years certain tobacco cultivars have been developed at the Tobacco Experiment Station, Greeneville, TN, that have shown resistance to the tobacco aphid. Within the last year studies have been made to determine the biological mechanisms of aphid resistance. Selected mechanisms included: rate of growth from nymphs to adults, longevity of adults, fecundity, and length of reproductive cycle.

AN ASSESSMENT OF BACILLUS THURINGIENSIS IN THE GUT OF *VANESSA CARDUI* (L.) USING MAGNETIC RESONANCE IMAGING

Melinda M. Gibbs¹, P.L. Lambdin¹, J.F. Grant¹ & Jon Dyke²
¹Department of Entomology and Plant Pathology
²Nuclear Magnetic Resonance Lab-Chemistry Department
The University of Tennessee
Knoxville, TN 37901-1071

Magnetic Resonance Imaging (MRI) is an ideal way of observing the internal structures of living organisms without causing any physical harm to the organism. MRI excites the protons of hydrogen molecules found in the body, especially those in water, using pulses of energy. Oppositely charged molecules are attracted to a strong magnetic field which is contained within an MRI machine. The altered state of the internal ions forms an image of water-containing structures. This technology provides scientists the opportunity to view and interpret certain internal processes, the composition of internal organs, abnormalities in tissues that may be caused by tumorous cells, or any foreign bodies, such as parasitoids or pathogens in insects.

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Parasitoids and pathogens are natural control agents commonly used against insect pests. The most widely used ingredient in biological pesticides for lepidopteran pests is the bacterium *Bacillus thuringiensis* (Bt). Bt products consist of bacterial spores and toxic crystals which, when ingested by the larvae, cause death by starvation usually within two days. A study was devised to monitor the degradation of the gut of the painted lady butterfly, *Vanessa cardui* (L.) After exposure to Bt. Second instar larvae were fed a diet treated with Bt and were allowed to feed for specified time intervals. Magnetic resonance images were then taken of the larvae gut 2, 4, 6, 12, 24, and 36 hours after the initial exposure to Bt. Compositional differences in the gut were detected twelve hours after ingestion. These findings agreed with similar studies which used MRI, Light Microscopy, SEM or TEM to evaluate internal processes of insects exposed to pathogens or parasitoids.

ORGANIC MATTER AND AQUATIC MACROINVERTEBRATE ASSOCIATIONS UPSTREAM OF ARTIFICIAL RIFFLES IN A SANDY BOTTOM STREAM

Scott N. Brown, Alan K. Bottomlee and Steve W. Hamilton
Center for Field Biology
Austin Peay State University, Clarksville, TN 37044

Studies in Ohio and Canada have shown artificial riffles to have beneficial effects on the stream fauna of channelized streams. Only recently have the effects of artificial riffles been documented in channelized sandy bottom streams characteristic of the West Sandy Creek watershed. The research demonstrated a significant increase in both abundance and richness of aquatic macroinvertebrates where artificial riffles were constructed in these sandy bottom streams. However, an unexpected significant increase in richness and abundance was noted in the nearest upstream control site as well. The significant changes at the control site may be related to increased deposition of organic matter. Deposition may have increased at the site because of reduced stream velocity resulting from the pooling effect of the artificial riffles. The riffle may act as natural debris dams causing progressive stream velocity reduction and a correlated increase in organic matter deposition closer to the riffles. Stream velocity profiles show a distinct decrease in velocity as the stream reaches the nearest upstream control site. Our study is attempting to determine if a correlation exists between the amount of organic matter, abundance and richness of benthic macroinvertebrates, and stream velocity at the sampling sites. In addition, the study will attempt to establish if the pattern of organic deposition is consistent with that reported for natural debris dams. If the results support our hypothesis then the study would show the more far-reaching benefits of artificial riffles in rehabilitating streams in this region and with these types of streams. Since the samples are currently being analyzed, the focus of this presentation is the methodologies used in the collection of samples and data for this project.

THE PIT SCALES OF THE NEW WORLD

Christof F. Stumpf and Paris L. Lambdin
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

Pit scales (Asterolecaniidae) constitute a large and economically important group of scale insects worldwide. The fauna is extremely rich and diversified with members occupying all of the major zoogeographical regions of the world. Worldwide, there are over 250 species of Asterolecaniidae recognized in 14 genera. 46 of these species occur in the New World representing 9 of the 14 genera (i.e., *Asterodiaspis*, *Asterolecanium*, *Bambusaspis*, *Grammococcus*, *Mycetococcus*, *Neoasterodiaspis*, *Palmaspis*, *Pollinia* and *Sclerosococcus*).

Some pit scales can only be found on specific host plants (i.e., several species of the genus *Asterolecanium* solely feed on palms, genera *Asterodiaspis* and *Bambusaspis* are monophagous on oaks and bamboo, respectively), while others may feed on plants from different families (i.e., *Asterolecanium pustulans* exists on 46 plant families). Most pit scales follow closely the distribution of their host plants. Knowledge on distribution is still incomplete.

Seven new species have been discovered from specimens obtained from the United States National Museum of Natural History. A new method of computer supported illustrations proves to be a successful tool for species descriptions. Structures that may be used to separate taxa include different types of wax glands, 8-shaped pore patterns, number of anal ring setae and characteristic shapes of the clypeolabral shield. These morphological characters are evaluated and a phylogenetic tree is proposed for the 9 pit scale genera of the New World using parsimony analysis.

MOSQUITO SURVEILLANCE OF EASTERN TENNESSEE

Kristy L. Gottfried and Reid R. Gerhardt
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

Mosquito populations were surveyed in Eastern Tennessee from June through October of 1997. Public awareness and interest of mosquitoes has increased in recent months due to regional cases of LaCrosse encephalitis as well as increased media publicity in the United States of mosquito-borne illnesses. The mosquitoes of interest were *Aedes albopictus* (Skuse) and *Ae. triseriatus* (Say). *Ae. albopictus* is a potential vector of LaCrosse encephalitis and Eastern Equine Encephalitis. *Ae. triseriatus* is the primary vector for LaCrosse encephalitis. Mosquito surveys were conducted to determine species distribution/seasonality and optimum mosquito trap height. Findings from the mosquito species collected in addition to the distribution/seasonal abundance will be integrated into a vector and disease monitoring system for Eastern Tennessee.

Adult female mosquitoes were collected with the CDC miniature light trap (light removed) and dry ice as the source of CO₂. Traps were deployed in six locations on a regular cycle for a 24 hour period in the Knoxville area. Two traps at each location were placed at six and three feet. *Ae. albopictus* were the majority of the adult mosquitoes collected (62%) followed by *Ae. trivittatus* (Coquillett), *Culex pipiens* (complex), *Ae. triseriatus*, *Ae. sticticus* (Meigen) and *Ae. vexans* (Meigen). Other mosquito species were collected but in relatively small amounts. *Ae. triseriatus* made up 8% of the total mosquitoes collected which verified the fact that the CDC light trap is not the optimum trapping method for this species. Preliminary findings compared in two locations revealed trends of trap height preference. The preferred trap height in an unprotected area was found to be traps placed at three feet. In comparison, protected areas of heavy tree cover and shrubbery appeared to have no consistent preference for trapping heights.

Future goals include extensive surveys in Eastern Tennessee of adults and mosquito eggs to determine population distribution throughout the region and seasonal abundance of the species. The use of ovitraps will be integrated into the trapping system for a more complete picture of the species populations present in the region.

SPECIFIC BINDING OF INTERFERON-GAMMA TO PARTICULATES FROM PROTOCEREBRUM AND HEMOLYMPH OF *MANDUCA SEXTA* LARVAE: SENSITIVITY TO HEPARINASE III

Michael S. Parker and D. D. Ourth
Department of Microbiology and Molecular Cell Sciences
The University of Memphis, Memphis, TN 38152

The structures of cytokines have been well-conserved across the evolutionary phyla. We set out to determine whether molecules similar to mammalian prolactin (PRL) and interferon- γ (IFN- γ) are present in larvae of the tobacco hornworm, *Manduca sexta*. Particulates from the hemolymph of 5th-instar *M. sexta* larvae were found to possess high-affinity binding sites which specifically bind human IFN- γ . The binding could be displaced by the acidic polysaccharide heparin; this displacement had relatively low affinity. Since the binding of IFN- γ is displaceable by polyacidic competitors, it is obviously dependent on polybasic motifs in the IFN- γ molecule. Treatment with heparinase III, but not with heparinase I, significantly inhibited the binding of IFN- γ to particulates from *M. sexta* hemolymph. The binding of IFN- γ to particulates from *M. sexta* protocerebra was less reduced by treatment with heparinase III. A large fraction of IFN- γ binding sites could recognize various basic growth factors and, perhaps, serve as a cell membrane repository of growth factors, and as a signaling system for the regulation of membrane glycoprotein biosynthesis and the synthesis of immune glycoproteins.

DISTRIBUTION AND CONTROL OF THE LONE STAR TICK (*AMBLYOMMA AMERICANUM* L.) IN CUMBERLAND CO., TENNESSEE

Chris G. Morris and Reid R. Gerhardt
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

The lone star tick, *Amblyomma americanum* (L.), is a hard-bodied tick notorious for transmitting disease-causing organisms to vertebrates. In particular the lone star tick serves as a vector host for the rickettsial organism, *Ehrlichia chaffiense*, the causative agent of human monocytic ehrlichiosis (HME). This disease, characterized by nausea, fever, vomiting, and general malaise, can be fatal to humans. In 1993, Dr. Steve Standaert of the CDC reported a HME epidemic in Fairfield Glade, Tennessee, a retirement golf community on the Cumberland Plateau. The University of Tennessee initiated an ivermectin treatment program in 1994 in an attempt to control the lone star tick population.

The white-tailed deer is the primary host for all three feeding stages of the lone star tick. Fairfield Glade's northern border connects to the Catoosa Wildlife Refuge and subsequently has a large white-tailed deer population. Ivermectin (commercially available in liquid form as Ivomec®) is an endectocidic drug harmless to most vertebrates. The deer were fed corn treated with 50 ml Ivomec®/22.5 kg whole kernel corn. The corn was distributed in four automatic deer feeders in Heatherhurst (the location in Fairfield Glade where most people were believed to have contracted HME in 1993). Free-living lone star tick populations were sampled by cloth drags and carbon dioxide traps in grass and woods habitats near three of the feeders and three control areas from 1994-1996. Preliminary analysis of these data suggests that control was effectively acquired during this time period.

In 1997 a new treatment area was chosen to expand the area of control. The previously treated area was sampled in addition to the new treatment and control areas. Investigators continued to sample this area in an effort to measure the rate of return of the lone star tick population. Preliminary data analysis suggests that the tick population remained the same in the previously treated area or increased at a slow rate.

In July of 1997, investigators also initiated a study of the natural distribution of the lone star tick on the Cumberland Plateau. Again, populations were sampled in the Heatherhurst area by the cloth drag method. Distribution was studied on golf courses because of the sharp habitat demarcation provided by the fairway and rough. Parallel linear drags of 100 m² were performed in five habitats: 5 and 10 meters into the rough, 5 and 10 meters onto the fairway, and the edge (area between the rough and fairway). Preliminary data suggest that populations of all three free-living life stages are concentrated in the rough and edge habitats (particularly 10 meters into the rough). Future investigation will clarify the exact distribution.

EARLY SEASON THRIPS CONTROL ON COTTON IN WEST TENNESSEE

Randy S. Mizell, G. L. Lentz and N. B. Van Tol
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

Thrips have been considered as common early season pests of cotton for many years. Thrips are usually the first insects to attack cotton and cause significant damage. If thrips are not controlled, the resulting damage may retard plant growth and reduce stands, and cause delayed fruiting, maturity, and harvest.

In 1996, research was conducted at the West Tennessee Experiment Station in Jackson, Tennessee to determine the efficacy of selected insecticides for early season thrips control, and to determine the impact of these insecticides on bloom counts, plant heights, node of first position square, and yield. Treatments and rates were Gaucho 480F ST (0.51 g AI/kg seed), Payload 15G (1.12 kg AI/ha), and Temik 15G (0.56 kg AI/ha).

The number of adult thrips was significantly affected by treatment on 3 of 6 sampling dates. Larval thrips numbers were affected by treatment on 5 of 6 sampling dates. Adult thrips populations were significantly reduced on plants treated with Temik on May 27 when compared to the Gaucho-treated and the untreated plants. On May 31, adult numbers on Temik- and Payload-treated plants were significantly reduced when compared to Gaucho-treated plants and the untreated. On June 4, 11, and 18, adult numbers were not significantly different. On June 14, adult numbers on Gaucho-treated plants were significantly higher than the untreated check.

Thrips larval numbers on May 27 and May 31 were significantly lower in insecticide-treated plots compared to the untreated. On June 11, 14, and 18, Temik and Payload significantly reduced larval numbers compared to the Gaucho-treated and untreated plants.

Temik-treated plots also produced significantly greater plant heights than the Gaucho and untreated plots. Early flower production was not significantly affected by chemical treatment on July 15, 18, or 22. The node of first position square was significantly higher in the Payload-treated plots than the Gaucho-treated and Temik-treated plots. Lint yields at first and second harvests were not affected by treatment. Total lint yields did not differ among treated or untreated plots.

Insecticide treatments significantly affected adult and larval thrips populations, plant heights, and node of first position square. The variables not significantly affected by treatment were bloom counts and lint yields.

ISOLATION AND CHARACTERIZATION OF ANTIBACTERIAL PROTEINS FROM *HELIOTHIS VIRESCENS* HEMOLYMPH

Kyung T. Chung and Donald D. Ourth
Department of Microbiology and Molecular Cell Sciences
The University of Memphis, Memphis, TN 38152-6041

Late fifth instar larvae were vaccinated with live *Enterobacter cloacae* and then bled during the early pupal stage. A high level of antibacterial activity was found against Gram-positive and Gram-negative bacteria in the pupal immune hemolymph. Two antibacterial factors were purified from the immune hemolymph. One of them was lysozyme and the other a novel 21 KDa antibacterial protein. Lysozyme was purified by heat treatment at 100°C, Sephadex G-50 gel filtration, CM-Sephadex ion exchange chromatography and reverse-phase HPLC. The molecular weight of *Heliothis* lysozyme was approximately 16 KDa by SDS-PAGE which is greater than other insect lysozymes and chicken lysozyme. The N-terminal amino acid sequence of lysozyme was determined and showed that *Heliothis* lysozyme is very homologous with lysozyme of *Manduca sexta*. The 21 KDa antibacterial protein was purified using the same methods as for lysozyme purification but without the CM-Sephadex ion exchange chromatography step. The 21 KDa antibacterial protein has bactericidal activity against *E. coli* D31 and hemagglutination (lectin) activity with rabbit red blood cells.

COTTON APHID CONTROL IN TENNESSEE

Gary L. Lentz and N. B. Van Tol
West Tennessee Experiment Station
The University of Tennessee, Jackson, TN 38301

The cotton aphid, *Aphis gossypii* Glover, has become a major pest of cotton in certain areas of the cotton belt in the U.S. One of the major problems is that the application of insecticides to control boll weevil, *Anthonomus grandis* Boheman, and bollworm/tobacco budworm, the Heliothine complex, causes populations of the aphid to grow exponentially. Cotton aphids have also become resistant to many of the chemicals which have controlled them for many years. Other factors contributing to the buildup of aphid populations are changes in the physiology of the host plant. Increases in plant nitrogen and carbohydrates reportedly contribute to increases in aphid populations.

Several new insecticides have been evaluated in recent years for control of cotton aphid. Furadan has received widespread attention because of its effectiveness, but with a 14-day reentry period, producers in high pressure insect situations are reluctant to use the compound. Acetamiprid, an experimental insecticide from Rhone-Poulanc, has been shown to be highly effective in controlling the cotton aphid. Provado, developed by Bayer, is also one of the most effective of the new insecticides.

THE GYPSY MOTH: PREPARING FOR THE INVASION

Charlie A. Chilcote, P. L. Lambdin, and J. F. Grant
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville, TN 37901-1071

Because the gypsy moth, *Lymantria dispar* (L.) Threatens to move into Tennessee within the next decade, The University of Tennessee is initiating projects to investigate the impact of this insect on Tennessee's biodiversity and resources. Projects have been initiated to obtain baseline data on the arthropod fauna within the region to determine the potential impact of the GM on native fauna and flora. Long-term impact plots are being established to monitor GM impact in Tennessee's forests and urban interfaces. These plots are part of a comprehensive study of the insect fauna prior to the invasion of GM. A combination of sampling techniques are being utilized (i.e., malaise trapping, pitfall traps, collecting soil biota, foliar sampling). Information from these plots will enable researchers in Tennessee to monitor insect populations prior to the invasion and determine what impact GM has on other insects (e.g., non-target lepidopteran, parasites, and predators). This information will aid in establishing, comprehensive strategies to manage resources as the GM moves into and through the state. Also, a survey has been initiated to determine if the fungal pathogen, *Entomophaga maimaiga*, occurs in the state. Its presence or absence will influence the control strategies adopted to control the gypsy moth in Tennessee. If *Entomophaga maimaiga* is not in the state already, UT hopes to introduce it ahead of the main front of the gypsy moth. Field release of this fungus will depend partly on lab trails of two strains of E.M. against nontarget lepidoptera.

WOOLY APPLE APHID, *ERISOMA ANIGERUM* (HAUSMANN) AN IPM PERSPECTIVE

Frank A. Hale, Catharine Mannion, and Mark Halcomb
Extension Entomology and Plant Pathology
The University of Tennessee, Nashville, TN 37211

The woolly apple aphid is a pest of crab apple, apple, pear, hawthorn, mountain ash and elm and is transcontinental in distribution. Their feeding causes the formation of the knotty galls on the roots. These galls increase in size over time, predispose the roots to fungal attack and the woolly apple aphid has been shown to transmit apple canker (*Pezicula malicorticia*) in certain parts of the country. The use of Merton Malling rootstocks from resistant Northern spy apple trees has reduced its status to a sporadic pest on apples. Unfortunately, resistant rootstocks are not thought to be used on crab apples in Tennessee commercial nursery production. The general practice is to use seedling apple rootstocks to graft crab apples.

Resistant, dwarfing rootstocks such as M111 or M106 cost approximately 33 to 50 percent more than seedling rootstock. There is not a high demand from the consumer for dwarf crab apples.

Generally infested Robinson crab apple trees dug from the field were put in 5 gallon pots during the winter of 1996. Ten insecticide treatments plus an untreated control were used in the test. There were four single tree replicates per treatment. The trees were treated on May 24, 1996. The whole tree and the planting media surface was sprayed. A half gallon of water was applied to all trees soon after foliar and/or granular treatment.

The treatments were evaluated on October 4, 1996. The trees were first lifted out of the containers and rated as either infested or not infested. The number of colonies on the outside of the root mass of each plant were counted. The maximum size of a single woolly apple aphid colony was defined as being 0.75 square inch. The infested root masses were rated as light (10 or fewer colonies, medium (11 to 30 colonies) or heavy (31 or more colonies).

The treatments were not significantly different. It should be noted that treatment 10 (Orthene 2.5 G) had no infestation and the means for treatment, 1, 2, 3, 8 and 9 were less than the low infestation rating of 1.

The use of multiple applications of insecticide may be necessary to control woolly apple aphid on container grown crab apple. More cost effective ways need to be developed to utilize resistant rootstocks in managing woolly apple aphid on crab apple. If grower awareness is not increased, insecticides with all the associated costs will continue to be the primary means of control.

THE ENTOMOPATHOGENIC FUNGUS *PANDORA* *NEOAPHIDIS* IN POPULATIONS OF THE TOBACCO APHID, *MYZUS NICOTIANAE*, IN GREENEVILLE, TN

Roberto M. Pereira

Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville TN 37901-1071

The tobacco aphid, *Myzus nicotianae* (Homoptera: Aphididae), causes significant damage to tobacco crops. However, damage by this pest is limited by the occurrence of a fungal pathogen at the end of the season. In Tennessee, as in Kentucky and North Carolina (Yu et al. 1995, Environ. Entomol. 24: 962-966), *Pandora neoaphidis* occurs in populations of the tobacco aphid causing high mortalities in late summer/early fall. A study was conducted at the Tobacco Experiment Station in Greenville, TN to estimate the prevalence of the fungal disease in populations of the tobacco aphid, and to evaluate the effect of different aphid-resistant breeding lines on the prevalence of the insect fungal disease.

Four plots were planted with seven tobacco breeding lines including: TN90, GR-139NS, TI-1068, 97-INS-01, 97-INS-02, 97-INS-03, 97-INS-04. Except TN90, the standard variety used as control, all other breeding lines were reportedly aphid-resistant. The breeding line TN90 was planted both with and without fungicidal treatment applied to the soil at planting time, whereas all other breeding lines received no fungicidal application. Except to the absence of any insecticidal

application, the tobacco plots were managed according to standard procedures. Aphid populations and *P. neoaphidis* prevalence were evaluated weekly between July and October on three plants selected at random within each treatment/plot. Number of aphids were counted according to methods described by Tappan (1963, J. Econ. Entomol. 56: 34-40) and Reed & Semtner (1992, J. Econ. Entomol. 85: 1963-1971). Live and diseased aphids were counted separately, and a disease index was calculated as an indication of the level of fungal disease affecting the aphid population. Samples of the diseased insects were taken and returned to the laboratory for isolation of the fungal pathogen. Fungal isolates were identified and may be used in future studies as control agents for aphids in tobacco and other crops.

Results showed that aphid population peaked on September 16, while the fungal prevalence peaked two weeks later on September 30. Aphid population was lowest on breeding lines GR-139NS, a non-secreting tobacco with no foliar pilosity, and TI-1068. Aphid populations on all other treatments were similar. Except TI-1068, on which *P. neoaphidis* never reached epizootic levels due to low aphid population, the fungal prevalence was similar on all breeding lines. On the non-secreting tobacco line GR-139NS, fungal prevalence reached epizootic levels despite the low aphid population. The reasons for these results are not clear, but it is possible that the tobacco foliar secretions are detrimental to the development of the fungus. *Pandora neoaphidis* may reach epizootic levels in secreting lines only when aphid populations are very high, while on non-secreting lines, lower aphid population levels may be sufficient to support epizootic levels of the fungal disease.

PROCLADIINI AND MACROPELOPIINI OF THE SOUTHERN APPALACHIANS (DIPTERA: CHIRONOMIDAE)

Charles N. Watson, Jr.
Aquatic Resources Center
P.O. Box 680818, Franklin, TN 37068-0818

The Tribe Macropelopiini belongs to the Subfamily Tanypodinae of the Chironomidae. The tribe occupies a plesiomorphic position within the Tanypodinae. The larvae are aquatic benthic predators that prefer lentic habitats with a silt or mud substrate. Most are cold stenotherms. They are often found in poorly buffered waters. Species of Macropelopiini are rare and local in temperate North America. Larvae of most species are restricted to seeps, springs and pool areas of small mountain streams. From 1988 to 1993 Macropelopiini were sought in the southeastern United States with emphasis on suitable habitats at higher elevations in the southern Appalachians. Larvae were reared in the lab to obtain complete associations and confirm identifications. The following species were found: *Alotanypus aris* Roback, *Apsectrotanypus johnsoni* (Coquillett), *Bethbilbeckia floridensis* Fittkau & Murray, *Brundiniella eumorpha* (Roback), *Macropelopia decedens* (Walker) and *Psectrotanypus dyari* (Coquillett). In addition, an undescribed species close to *Psectrotanypus discolor* (Coquillett) was found at high elevations in Virginia, Tennessee and the Carolinas.

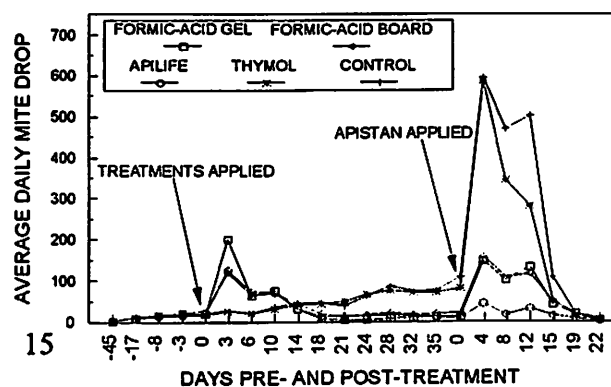
EVALUATING NEW METHODS TO MANAGE HONEY BEE PARASITIC MITES

John A. Skinner, J. P. Parkman, and M. D. Studer
Extension Entomology and Plant Pathology
The University of Tennessee, Knoxville, Tennessee 37901-1071

Introduction. New methods are needed to manage *Varroa* and tracheal mites, which have decimated feral and managed honey bee colonies in the USA during the past decade. There is only one registered pesticide available in the USA for each pest. And some populations of *Varroa* are beginning to exhibit resistance to Apistan, the only registered treatment available for this mite.

Preliminary trial - 1996. In August 1996 a field trial was begun in three commercial apiaries to evaluate alternative treatments. Treatments utilized 65% formic acid absorbed into bed padding and into sponges, held in ziploc bags; a mixture of 76% thymol, 16% eucalyptus oil, 4% camphor oil and 4% menthol oil absorbed into a sponge; peppermint pattie (peppermint oil mixed into a sugar/shortening pattie); sugar/shortening pattie alone. The preceding treatments were placed above the brood cluster. Other treatments were Apistan strips, placed in the brood cluster; and peppermint and spearmint syrup, each applied in sugar water and fed to bees. *Varroa* samples were made at 0, 30 and 60 d post-treatment by placing 2 Apistan strips in the brood cluster for 24 h and collecting fallen *Varroa* using sticky board traps. Apistan reduced mite drop by 90% at 30 d post-treatment. The only other treatment providing control (12% reduction) at 30 d was a formic acid treatment (200 ml absorbed into sponges held in a ziploc bag perforated with holes on one side). Mite drop in control colonies increased by 100% at 30 d. Colony decline and death obscured results at 60 d.

Summer/fall trial - 1997. Two study apiaries were established in spring 1997. Four experimental treatments were applied in August: 1) a 65% formic acid gel enclosed in a plastic bag; 2) a Homosote board soaked in 65% formic acid held in a sealed ziploc veggie bag; 3) Apilife VAR, essential plant oils absorbed in thin foam blocks; 4) thymol crystals held in a small, screen-covered petri dish. Treatments were removed 38 d after application. Apistan was then applied to determine number of mites surviving. *Varroa* was monitored using sticky board traps. To determine tracheal mite control, bees were collected before and after treatment and dissected. Formic gel gave the greatest *Varroa* drop at 3 d post-treatment; formic board and Apilife gave similar drops at 3 d (see figure). These 3 treatments gave similar results for 3-38 d post-treatment. Mean percent control (total number mites dropped during 38-d period/total number dropped in 38 d+total dropped during Apistan treatment period) was 85, 55, 44, 27 and 22% for Apilife, formic gel, formic board, control and thymol treatments, respectively. But, all gel and some board treatments had desiccated by 21 d affecting their performance. Also, the strong essential oil vapors of Apilife affected queen laying and, thus, colony strength (bees+brood). *Varroa* reduction in Apilife-treated colonies was more a result of colony weakness than product efficacy. Mean strength reductions after treatment were 52, 41, 22, 14, and 13% for thymol, Apilife, formic board, formic gel and



control colonies, respectively. Mean tracheal mite infestation was reduced 93, 92, and 73% in formic board-, formic gel- and Apilife-treated colonies, respectively. Mean infestation rose in thymol-treated (80%) and control (8%) colonies. Formic acid treatments showed the most potential, however, delivery and application timing must be improved.

TIPHIA VERNALIS, A PARASITOID OF JAPANESE BEETLE

Catharine Manion
Nursery Crop Research Station
Tennessee State University,
Nursery Crop Research Station, McMinnville, TN 37110

Japanese beetle (*Popillia japonica*) was accidentally introduced in the U.S. in 1916 and very quickly became a significant pest. The adult beetle feeds on the foliage and fruits of several hundred species of fruit and ornamental trees, field, and vegetable crops. The larvae (grubs) feed on the roots of various plants; particularly grasses. After its introduction, Japanese beetle spread rapidly due to the favorable climate, an abundance of host plants and turf, and no natural enemies. By 1962, the infestation covered more than 100,000 square miles in 14 eastern states. Currently, Japanese beetle has been found or established throughout the northeast, mid-Atlantic, and parts of the Midwest.

Tiphiidae is the dominant group of hymenopterous parasites attacking grubs (Scarabaeidae) in the Far East. They are solitary wasps, develop externally on late instar host grubs, and usually have one generation per year. *Tiphia vernalis* adults emerge in the spring which gives rise to the name "spring *Tiphia*". Adults feed on honeydew from aphids, scale insects, and leafhoppers. The female digs in the soil in search of a host grub and when she locates one, she stings and temporarily paralyzes it, which allows her to lay a single egg on the ventral side of the grub. The location where the egg is laid on the grub is indicative of the species of *Tiphia*. The larva hatches and punctures the grub for feeding which ultimately kills the grub. Within a few days, the larva attains its full size and spins a cocoon. The larva pupates and becomes an adult within the cocoon and emerges the following spring.

As a result of collection efforts in Japan, Korea, and China by the USDA, numerous species of Tiphiidae, Tachinidae, and Scoliidae were considered for biological control of Japanese beetle. *T. vernalis* was first released in New Jersey in 1925 and was found to be established by 1928. From 1928 to 1950, the parasites were so abundant at some sites that they served as collection points for more releases. It was reported that *T. vernalis* caused substantial reductions in beetle populations. Past researchers noted that establishment was dependent on having an available food source for the adults and an adequate population of grubs in close proximity. The life cycle of *T. vernalis* is well adapted to that of Japanese beetle.

While conducting field trials in a commercial nursery in Grundy County, Tennessee, *Tiphia* cocoons and adults were found. There have been no documented releases of *Tiphia* in Tennessee and it was not expected to disperse far from previous release sites. It is possible that it came in with nursery stock from North Carolina that contained parasitized grubs.

T. vernalis has been most recently reported in Ohio, North Carolina, Indiana, and now Tennessee. Efforts are underway to evaluate techniques in collecting, transporting, rearing, and releasing *T. vernalis*. A working group made up of researchers from the USDA-APHIS and ARS, Symbiont, and Tennessee State University has been formed to address these issues and consider further foreign exploration.

INSECT'S RESPONSE TO STRESS

Karl H. Jopin

Department of Biological Sciences

East Tennessee State University, Johnson City, TN 37614

Although we may not think about it, an insect's life is constantly being challenged by various stresses. My lab investigates various aspects of stress in insects and I will describe some of this research. One of the characteristics of pupal diapause in the flesh fly, *Sarcophaga crassipalpis*, is its increased ability to withstand heat and cold shock. Proteins labeled during these stresses demonstrate that heat shock proteins (HSP) are induced in response to both cold and heat shock. My students have demonstrated that HSP are also induced by heavy metals, such as cadmium, copper and zinc, in the freshwater invertebrates *Chironomus tentans*, *Daphnia magna* and *Emphemerella* sp. We are now looking to see if expression of the HSP also protects against lethal heavy metal exposures.

Heat shock and cold shock also has effects on circadian based behaviors. In *S. crassipalpis* these stresses can shift activity in wandering larvae activity behavior from a diurnal to a nocturnal pattern, affect time of eclosion (HS) or day of eclosion (HS and CS), ptilinum activity patterns and respiration. Recent molecular findings suggest that a small hsp (Schsp 23) is constitutively expressed during diapause but not nondiapause stages. Thus, we have begun to explore some aspects of the profound effects stresses can have on the molecular, physiological, behavioral and evolutionary responses in insects.

LA CROSSE ENCEPHALITIS IN EASTERN TENNESSEE

Reid R. Gerhardt
Department of Entomology and Plant Pathology
The University of Tennessee
Knoxville, Tennessee 37901-1071

LaCrosse virus (LAC) causes a viral encephalitis primarily in children under 16 years of age. Twenty years ago, most reported cases were from the upper mid-west of the USA. Currently, more cases are being reported from the Appalachian region especially West Virginia. LAC is associated with oak-hickory hardwood forests in the eastern third of the USA and the primary vector is *Aedes triseriatus* (Say) the eastern treehole mosquito. This small, timid mosquito is a daytime feeder that rarely leaves the shade of the forests where they are produced. They normally feed on squirrels and chipmunks, but will readily attack humans when encountered in their habitat. In addition to natural treeholes, larvae are also found in manufactured containers such as bird baths, cans, bottles and used tires.

LAC is normally transmitted by *A. triseriatus* among squirrels and chipmunks, but may be transmitted from the adult female mosquito to her offspring. This means that a certain proportion of the newly emerged female mosquitoes in the spring are infective and do not have to feed on a wild host before transmitting the virus to humans.

Prior to 1997, the usual numbers of LAC cases in eastern Tennessee were usually one or none. The Center for Disease Control in Fort Collins, CO has determined that there were six confirmed and probable cases of LAC in eastern Tennessee in 1997 [Cocke, Claiborne, and Knox (2) counties]. One case was from a child who had recently moved from Bell Co., KY. Oviposition traps (10/site) were placed in suitable habitat at 3 of the home sites (Cocke, Claiborne, and Knox counties) and the eggs sent to Fort Collins for virus isolation. In a separate, but related project, sets of 10 ovitraps were positioned in two localities in Knox, Anderson, Sevier and Cumberland counties. Virus isolation results are expected in early 1998.

DRAGONFLIES OF GUANACASTE PROVINCE, COSTA RICA

George L. Harp
Department of Biological Sciences
Arkansas State University
State University, AR 72467
Knoxville, Tennessee 37901-1071

Dragonflies were surveyed in the Guanacaste Area of Conservation during the dry season, from 18 March through 3 May 1996. This was the first comprehensive dragonfly survey in Costa Rica during the dry season. Of the 7 species collected, one is newly reported for Costa Rica, and ten are newly reported for Guanacaste State. Common species included *Hetaerina capitalis*, *H. cruentata*, *Argia ulmea*, *Erythrodiplax funerea*, *E. umbrata*, *Pantala flavescens* and *Uracis imbuta*.

EXOTIC AND INVASIVE PLANTS AND ASSOCIATED INSECTS ALONG ROADWAYS IN TENNESSEE

Don L. Sudbrink, Jr., Jerome F. Grant and Paris L. Lambdin
Department of Entomology and Plant Pathology
The University of Tennessee
Knoxville, Tennessee 37901-1071

Exotic plants are introduced species that may pose a serious problem in residential and rural areas, where they can invade pastures, crops, orchards, nurseries, and landscapes, as well as highway and railroad rights-of-way. These introduced plant species also can pose a serious problem in forests, where their management is often difficult and expensive.

Exotic and invasive plant pests can impact land utilization over a broad geographical region and hinder efficient land utilization, as well as negatively impact native plant species. Once an exotic plant becomes established in a new area, it can drastically affect the floral composition and community structure of the area. The widespread use of chemical herbicides to manage exotic plant species also poses economical and environmental concerns.

Little information is available on the state-wide incidence of exotic and invasive plant species along roadways in Tennessee. Acquisition of this type of information can lead to better management, if necessary, of exotic plants and enable researchers to investigate biological control opportunities. This approach can limit the spread and impact of exotic plant species.

In 1997, we began a two-year study of exotic and invasive vegetation along highway rights-of-way in Tennessee, with support from Tennessee Department of Transportation and the Federal Highway Administration. The objectives of the study are to: 1) identify exotic plant and invasive plant species, 2) quantify plant populations, 3) assess potential threat of these plants, and 4) evaluate potential opportunities for biological control. Exotic or invasive species were found at more than 200 sample sites along Tennessee highways. In the qualitative survey, about 75% of the list of Tennessee State Noxious weeds were found, and about 60% of the invasive species list of the Tennessee Exotic Pest Plant Council were also found. Several invasive plant species were found in abundance in quantitative sampling, including; Japanese honeysuckle, Johnson grass, lanceleaf plantain, and large crabgrass. Several invasive species found also may be potential biological control targets in Tennessee, including; purple loosestrife, spotted knotweed, Canada thistle, and bull thistle. Associated herbivorous insect species were collected from each of these plant species which may have an impact on their development and spread and will be investigated further.

KIDS + BUGS = ENTOMOLOGICAL FUN

Jerome F. Grant and C. Steven Murphree
Department of Entomology and Plant Pathology
The University of Tennessee
Knoxville, Tennessee 37901-1071
and
Biology Department
Belmont University
Nashville, Tennessee 37212-3757

Most kids have a natural curiosity about their world and enjoy exploring nature. As many of us discovered at an early age, insects are great tools to foster and nurture that curiosity. In December 1997, entomologists in the great state of Tennessee have an excellent opportunity to share our world of insects with about 3,000 school-age kids. The National Meeting of the Entomological Society of America (ESA) will be held in Nashville at Opryland in mid December. On the last day (December 18) of the meeting, ESA will host Insect Expo '97, a wonderful Educational Outreach Program for kids of all ages!! Kids will be able to gain a better understanding and appreciation of the world of insects through a variety of activities, such as insects as food, insect handling, and numerous other hands-on, interactive, and display presentations.

We encourage each of you to participate in Insect Expo - it is a great way to excite and stimulate young minds. We are the host for this year's ESA Annual Meeting and for Insect Expo, so let's join together and show our volunteer spirit!! Your assistance is essential to ensure that these young kids have an unforgettable experience at Insect Expo '97. Interacting with kids at Insect Expo will leave you with a feeling of satisfaction and accomplishment, as well as rejuvenate any stale and tired "attitudes". The main result, however, will be the excitement and joy in the eyes of the kids -- they will leave Insect Expo with a feeling of awe and wonder about insects and their world. *Be a part of the excitement, join Insect Expo today!!*

TENNESSEE ENTOMOLOGICAL SOCIETY
Minutes of the Board of Directors Meeting
August 18, 1997

President Frank Hale convened the meeting at the District II offices at 10:00 a.m. Present were TES members Youmans, Grant, Powell, Cagle, Murphree, Hamilton, Latson, Haun, and Lentz. Hale stressed that this will be a historic year for entomology in Tennessee with the TES meeting, the national ESA meeting and the Southeastern Branch Esa meeting being held between October and March. There is also much in the news about insects and arthropods, such as the southern pine beetle, periodical cicadas and brown recluse spiders.

The board discussed potential new members and how to attract them to the meeting. CCA points should be available to those attending the meeting. It is recognized the meeting program can not be finalized much earlier. Special Letters will be included in the call for papers to attract new members. Most Tennessee ESA members who are not TES members are industry or small college personnel.

Secretary Lentz read the minutes of the previous meeting and members made notes as to items to discuss.

Program Chair Murphree had several questions about the program for the coming October meeting. Should the keynote topic rotate among industry (PCO vs agriculture), regulatory, and university research? Grant suggested the keynote topic should be one which is very attractive. He wanted to bring a keynote speaker to the meeting, but two that would fit well were not available. These were a fire ant expert from Gainesville and an exotic plant expert. He contacted Chris Simon who was here in 1985 when one brood of the periodical cicada emerged and Christ suggested that Dr. Gene Kritsky of Cincinnati be contacted or Dr. Tom Moore of the University of Michigan. A **CALL FOR PAPERS** will go out soon. Murphree has an updated membership list. Listing the program on a web site was discussed. Hensley of UTK has maintained a combined extension-teaching-research page and an attempt will be made to put the program on this page ASAP. A map to the hotel will be included in the mail out. The hotel phone number will be listed, but a hotel registration form will not be mailed. The paper deadline will be September 19. Discussion of encouraging new memberships, especially those in industry, ensued. Grant indicated that he needed an updated list of prospects, and would give these to Lambdin. Latson listed three groups that could be targeted. Grant will work with Lambdin to make some contacts, especially to industry personnel. Murphree indicated he would be able to write the letters for the mailout this week and that the mailout should be accomplished by August 29. For the letter for industry, Lambdin will be asked to provide a main cover letter and Murphree will provide the **CALL FOR PAPERS**.

Powell discussed Local Arrangements. A block of 22 rooms has been set up at \$50 single or double. Check-in is at 2 p.m. and check-out is at 1 p.m. The meeting room will cost \$125/day; coffee will be \$36/day for 2 gallons of coffee each day. The meeting room was scheduled for 8-5 only, but Powell will try to get that changed. The meeting room size was discussed. The room reservation cutoff date is October 1. Hale offered to bring a PA system. Murphree will bring a screen. Latson will bring a good overhead projector. Murphree will try to bring a VCR projector. The 'banquet' will be held at Luby's Cafeteria again. Murphree indicated that one TES member wants to display some art work using insects. This is to be done on Thursday.

Latson gave the Publicity Report. There are many things going on in the state and we need to take advantage of these.

There was not report from the Constitution Committee.

Hamilton of the Awards Committee indicated that he had been in touch with Gerhardt, a former chairman. Plans are being made to ensure that the Howard Bruer winner receives the award. The committee was late in making the presentation this past year. The criteria for the Richard Caron Award for Outstanding Entomologists and the nomination procedure were discussed. Lentz is Chair of the Constitution/Operating Procedures Committee and that committee should consider changes and bring them to the board meeting in October.

Cagle requested that individuals file their insect situation reports with him.

Publication of the Firefly was discussed. There was little benefit to printing front and back.

Murphree indicated that he will include committee assignments in the mailout.

President Hale adjourned the meeting at 12:00.

Gary L. Lentz
TES Secretary

TENNESSEE ENTOMOLOGICAL SOCIETY
Minutes of the Board of Directors Meeting
October 16, 1997

Dr. Frank Hale convened the board meeting at 10:37 a.m. at the Ramada Inn Governor's House. A correction was made on page 21 of The Firefly, volume 11, to change the date to October 18. Headings were also changed on pages 19 and 22, the first to indicate that it was a Board of Directors Meeting and the latter to indicate that it was a Business meeting. Hale asked if the nomination deadline had been changed to August 1. This has been incorporated in this Firefly. Barton moved (Cagle seconded) that the minutes be approved as amended. The motion passed.

Barton distributed a copy of the Treasurer's report. Grant asked if the sustaining dues were a result of the recent mailout. Hendrix's membership application was a result of Lentz's contacting him. Barton asked that the digression of membership discussion not be included in the Treasurer's report. He pointed out that the August 1 report included a 'corporate dues' from Lee Greer of Valent and should be reported as a donation. Barton sends Greer a receipt for dues and registration. This is shown on line 5 of the updated report as \$5 dues, \$20 registration and \$25 for corporate dues. The other question was about the CD. Barton receives only one communication from the bank each year which occurs just a few days before the meeting. Barton talked with a CPA about the interest being taxable. We made about \$50 interest dividend this past year. He said we should ignore IRS on the issue. One pin was sold when a corporate dues was paid. Barton asked if the pins should be replenished. Youmans asked if the CD should be cashed in and then reinvested. Lambdin moved (Youmans) that the report be accepted as reported to the board. The motion passed. Youmans moved (Cagle) that the CD be cashed in when it comes due and the new treasurer reinvest it. The motion passed.

Lambdin reported on the membership. There is a need to try to complete the e-mail and FAX numbers. Barton indicated that the new registration forms have e-mail and FAX number requests. The mailout included a letter to the membership. Some student members are lost each year, but new ones are gained. Youmans asked about student membership. Grant reported earlier that there are 76 ESA members in Tennessee and only 24 are members of TES. TES has 69 total members. Lentz reported that only 10-12 ESA members from Tennessee regularly vote in the branch elections. Grant stated further that the paper submission for the Chattanooga meeting was low and more papers would be accepted by Jeff Mink, the program chairman. Grant discussed the number of oral papers presented annually at previous meetings since 1990 (157, 127, 110, 143, 109, 106, 120, and only 68 so far for the Chattanooga meeting). Lambdin moved (Barton) that the membership report be accepted. The motion passed.

Hamilton reported on the awards committee. The Howard Bruer Award will be given this year to Nancy Warden, a student at UTM. A nomination has been made for the R.E. Caron Award and this will be announced at the business meeting. The Awards Committee approved the nomination of Dr. Carroll Southards as the Outstanding Entomologist for 1997. This nomination was approved in a phone poll of the board. The announcement will be made at the business meeting. Dr. Southards will not be attending the meeting this year and it is hoped that the award can be made next year. Murphree moved (Cagle) that the awards committee report be accepted. The motion passed.

Lentz reported that there were no changes in the TES constitution or submissions to change the operating procedures. The motion was moved, seconded and passed to accept this abbreviated report.

Powell expressed thanks for assistance in local arrangements. Hale expressed concern that the room may be getting crowded and we might have to consider meeting elsewhere. To double the space would be very costly to TES. Murphree suggested that Belmont might be available. Barton commented to the chair of the auditing committee on receipts not totalling the amount paid to Powell. Last year, there was \$250 contributed for the hospitality fund. Last year a check was written to Powell for \$120, but receipts were not turned in for ice and other incidentals. Grant said that Shamiyeh had a carryover of funds from last year. Funds will have to be solicited for next year. Hale moved (Lambdin) that the local arrangements report be accepted. The motion passed.

The nominating committee report was given by Grant since Harp could not make the early board meeting. Nominations are in order for Treasurer, President-Elect, and two Members-at-Large. The committee has two names for the Treasurer and President-Elect. The President-Elect nominee is Cletus Youmans and for Treasurer is Steve Powell. There are not currently names for Member-at-Large. Suggestions of the board were Catharine Mannion and an unnamed one. Hale moved (Powell) that the report be accepted. The motion passed.

Murphree reported for the program committee. He said there were 13 student papers and a good submission rate overall. He said the program would be longer than usual. Dr. Kritsky, our invited speaker, did present a seminar in Knoxville yesterday that was excellent. Murphree wanted to get together with Knoxville staff on any expenses due to the speaker. Usually UT pays lodging and mileage and TES picks up mileage remaining plus lodging. Barton said in the past TES paid mileage, the hotel bill, and per diem. UT usually gives an honorarium. Grant reported that the program was printed at UT but there was a problem in trying to fold them. There was no charge for the program. Haun moved (Grant) that the program committee report be accepted. The motion passed.

The Editor report was presented by Haun. He reported that Grant and Caldwell did an outstanding job putting The Firefly together. The cost was \$2 more than last year. The cost was \$2.92 each from Sir Speedy this year. The cover was printed at UT. That was \$1.50-2.00 cheaper than any other place. One hundred copies were printed. Extra copies are mailed to members who were not in attendance. Some are used in recruiting.

The question was raised as to TES recognition of the late Howard Bruer. Hale said he had gleaned some facts that he would present at the business meeting. A moment of silence would also be taken at the start of the business meeting tomorrow. Lentz indicated that he had a slide of R. E. Caron that he could project at the meeting. There were no reports of other deaths of past members.

Youmans indicated the auditing committee would meet this afternoon and had no report yet.

Powell will report for the Prediction and Evaluation committee at the business meeting tomorrow. He will solicit reports for the upcoming issue of The Firefly. The submissions for this year were discussed. Grant moved (Haun) that the report be accepted. The motion passed.

A publicity report was given by Latson. A flyer was prepared on the background of Dr. Kritsky. There needs to be information distributed at the Tennessee Academy of Science (TAS). Murphree will display the TES poster at the TAS meeting. Barton moved (Grant) that the publicity report be approved. The motion passed.

Haun asked about Honorary Members. The Operating Procedures should provide guidelines. Lentz pointed out that the Honorary Members were approved by the board of directors. Lambdin moved (Haun) that Harry Williams be approved as an Honorary Member. This was approved unanimously. Lambdin will prepare an 8x10 certificate.

Lambdin moved (Haun) that the meeting be adjourned. The time was 12 noon.

Gary L. Lentz
Secretary TES

TENNESSEE ENTOMOLOGICAL SOCIETY
Minutes of The Annual Meeting
October 17, 1997

The business meeting of the 24th annual meeting of the Tennessee Entomological Society was convened by President Frank Hale at the Ramada Inn Governor's House and Conference Center in Nashville at 8:00 a.m. on October 17, 1997. He read some biographical information on Howard Bruer who passed away this past August. He called for the reading of the minutes of the previous meeting. A motion was moved by Gerhardt, seconded, and passed that the minutes be approved as published in The Firefly with the insertion of 'Business' before 'Meeting' in the title.

Barton distributed copies of the Treasurer's report and presented the report. The auditing committee did look over the books yesterday. He indicated that TES had accumulated a little over the past year. Hamilton moved (Lambdin seconded) that the report be accepted. The motion passed.

Youmans presented the Auditing committee report. Members included Mizell, Hale and Youmans. The books were examined yesterday afternoon. All receipts were present and all disbursements/receipts reconciled. He commended Barton for the good work. Burgess moved (Grant) that the report be accepted as given. The motion passed.

Hamilton presented the Awards committee report. Judges for the student paper competition were C. Mannion, K. Vail, G. Haun, G. Harp and C. Watson. The H. L. Bruer Award was presented to Nancy Warden of Marshall Co. She is now a student at UTM. This award will be presented in a county ceremony. He distributed her name and address if members wish to send a letter of congratulations. There were 13 excellent student papers and the winner was Bryan Hed. Following the nomination by six past presidents of TES and approval of the board of directors, the R. E. Caron Award was presented to Dr. Carroll Southards, retired head of the Department of Entomology and Plant Pathology. He was unable to attend and the plaque will likely be presented to him at the meeting next year. President Hale asked Harry Williams to approach the podium and announced that he had been awarded Honorary Member status in the Tennessee Entomological Society. His certificate of award is 'in the mail.' Williams, retired extension entomologist for UT, expressed his appreciation.

Program committee chairman Murphree expressed appreciation to his committee for helping to put together one of the most outstanding programs. He also recognized Doris Caldwell for her assistance. He also thanked the Local Arrangements committee for their help in organizing the meeting. The report was accepted by the membership.

Lentz reported that the only change in operating procedures was the change to August 1 the deadline for nominations for the R. E. Caron Award. This was necessary to allow the board to review these nominations during the August meeting. The report was accepted.

Powell presented the Local Arrangements committee report. He thanked those who helped, especially Hale and Bogard. Grant also thanked Bill Shamiyeh (who was unable to attend the meeting) for his part in the breaks and the hospitality gathering. Contributors were Valent, Bayer, American Cyanamid, Ciba and Rohm and Haas. American Cyanamid (Youmans) also paid for the dinners of student paper presenters. The report was accepted.

Cagle encouraged the membership to submit reports of insect situations around the state. These serve as a historical document of insect outbreaks around the area. The report was accepted.

The Editorial and Publication report was presented by Haun. He thanked Grant and Caldwell for their excellent work, especially under the difficult circumstances this year with malfunctions of the office computer. One hundred copies of The Firefly were printed at a cost of \$292 to TES. Haun expressed reservations about Caldwell's rumored retirement. The report was accepted.

Latson indicated that the meeting needed to be publicized more to attract more interested individuals. He proposed some ideas to do so. The report was accepted.

Hale indicated that the Membership Committee had increased its work significantly. Lambdin reported for the committee. The main emphasis this year was to upgrade the membership list, including e-mail, phone and fax numbers. He encouraged the membership to work to recruit new members. The report was accepted.

President Hale called for Old Business. None was submitted. Hale then called for New Business. He asked that Nominations committee chair Harp present his report. The committee put forth the following nominations. For President-Elect: Cletus Youmans; for Treasurer: Steve Powell and two Members-at-Large: Catharine Mannion and Larry Latson. Lentz moved (Hamilton) that the nominations be closed and the slate be elected by acclamation. The motion passed and the officers were elected.

Hale asked that Past-Presidents stand. He then requested that these escort President-Elect Murphree to the podium. Hale then presented the incoming President Murphree with the Tennessee Entomological Society gavel. Murphree then presented Hale with a plaque recognizing the outgoing president for his contributions.

Grant also recognized outgoing Treasurer Barton for his contributions over the past six years.

Harp asked that the students be informed of the criteria for judging the student papers. The Awards committee will distribute this information to student paper presenters in the future.

President Murphree closed the meeting at 8:30 a.m.

Gary L. Lentz
Secretary TES

TENNESSEE ENTOMOLOGICAL SOCIETY
Minutes of the Board of Directors Meeting
October 17, 1997

The post meeting board meeting was convened by President Steve Murphree at 12:50 p.m. The first item of business was the selection of the committee chairs. Committees and their prospective chairs were as follows: Nominating - Harp; Auditing -Hale; Prediction and Evaluation - Powell; Awards - Hamilton; Publicity - Latson; Constitution/Operating Procedures - Burgess; Local Arrangements - Bogard; Membership - Grant; Program - Youmans; Publication/Editorial - Haun.

Location of the annual meeting was discussed. With any growth, the facilities here at the Ramada Inn would have to be expanded at a significant cost to the society. Mannion suggested the possibility of meeting at the TSU Experiment Station in McMinnville. This would save the society a significant amount of money for room rent and the big drawback being that individuals would have to travel from their hotel/motels to the meeting site. Mannion will check to see what eating facilities would be available in the area. There will be an attempt to solidify these arrangements in the next couple of weeks.

Murphree asked about a meeting date for next year's meeting. The board is charged with setting the date of the annual meeting. There were many benefits mentioned with a potential meeting in McMinnville. Board members were asked to poll their respective colleagues about meeting there. Youmans asked about the possibility of a meal being catered. Mannion indicated there was at least one caterer. Lentz proposed October 15-16, 1998 as the meeting date.

The list of new members to be approved by the board was presented by Barton. They were as follows: Keith Snyder, Gail Stratton, Bader Munir, Norman Goldenberg, William Hendrix, Christopher Morris, Melinda Gibbs, Nancy Van Tol, Jerry Harris, Emily Whiteley, Michael Parker, Gary Moughler, Kristy Gottfried, Scott Brown, Katrina Burns, Karen Vail, Roberto Pereira, Raymond McDonnell, Karl Joplin, Ron Seward, Charles Chilcote, Robert Williams, Steve Baskauf, Derek Puckett, Joshua Vlach, Bryan Hed, Stephanie French, James Moore. Twenty-one of the new members are students. Barton moved (Latson) that the board approve these new members. The motion passed.

Latson asked about any 'give aways' from TES that can be used at other meetings. The brochure is one item. Murphree will check with Grant.

Youmans asked if there was a guarantee that the students present papers. If they meet the deadline, they should be able to present. It is not likely that there would be thirteen papers again.

There was discussion about the keynote speaker for next year's meeting. Youmans volunteered individuals within American Cyanamid to present next year. This would allow students an opportunity to see firsthand how new compounds are developed by industry. Hale proposed a speaker from the nursery industry.

Murphree adjourned the meeting at 1:47 p.m.

Gary L. Lentz
Secretary TES

TENNESSEE ENTOMOLOGICAL SOCIETY
Treasurer's Report
October 1996 - October 1997

Books and Records audited 10-17-96 by Auditing Committee (Gary Lentz, Chair)

Balance on hand 10-17-96

Checking	\$3486.43
CD #16518	\$1116.86
TOTAL	\$4603.29

Number of pins on hand 10-17-96 14

DISBURSEMENTS

Jerome Grant (Plaques, firefly print and bind)	(\$ 359.45)
Dina L. Roberts (Student Award)	(\$ 50.00)
Steve Powell (Hospitality)	(\$120.00)
Ramada Inn South (Mtg. Rm., Coffee)	(\$ 389.36)

TOTAL DISBURSEMENTS **(\$918.81)**

INCOME

29 Regular Dues & Reg.	\$725.00
3 Late Dues	\$ 15.00
10 Student Dues	\$ 10.00
Cash Donation (Joe Dunn)	\$ 5.00
Cash Donation (Lee Greer)	\$ 5.00
2 Corporate Dues & Reg.	\$ 90.00
Lee Greer (Hospitality cash donation)	\$ 50.00
Walter Bachman (Hospitality cash donation)	\$ 50.00
Alan Hopkins (Hospitality cash donation)	\$ 50.00
Clete Youmans (Hospitality cash donation)	\$ 50.00
Rohm and Haas (Hospitality cash donation)	\$ 50.00
Badar Munir (Sust. Dues and Pin)	\$ 35.00
Norman K Goldenberg (Sust. Dues)	\$ 25.00
William H. Hendrix (Sust. Dues)	\$ 25.00

TOTAL INCOME **\$1,185.00**

BALANCE ON HAND (10-12-97)

Checking Account	\$3,752.62
CD #16518	\$1,175.65

(Current Cd interest rates is 5.5%, compounded monthly.)
Maturity date is 10-19-97 at which time the redemption value
will be \$1,181.06

TOTAL BALANCE ON HAND 10-12-97 **\$4,928.27**

Number of pins on hand 13

**ATTENDANCE ROSTER OF THE 1997 ANNUAL MEETING
OF THE TENNESSEE ENTOMOLOGICAL SOCIETY**

<u>MEMBER</u>	<u>AFFILIATION</u>	<u>LOCATION</u>
<u>Honorary Members</u>		
Dunn, Joe C.	American Cyanamid (Ret.)	Nashville, TN
<u>Regular Members</u>		
Bancroft, Harold	Univ. of Memphis	Memphis, TN
Barton, Harvey E.	Arkansas State Univ.	Jonesboro, AR
Bogard, James B.	TN Dept. Agri.	Nashville, TN
Cagle, Jimmy	TN Dept. Agri.	Winchester, TN
Chaudhary, Hans R.	TN Dept. Agri.	Harriman, TN
Chilcote, Charles	Univ. of Tennessee	Knoxville, TN
Cole, Bruce A.	TN Dept. Agri	McMinnville, TN
Copley, Ken	UT Ag. Ext.	Lyles, TN
Davis, Sylvester	TN Dept. Agri.	Mt. Juliet, TN
Eisler, Jim	TN Dept. Agri.	McMinnville, TN
Ekkens, David	Southern Adventist U.	Collegedale, TN
Gerhardt, Reid R.	Univ. of TN.	Knoxville, TN
Grant, Jerome F.	Univ. of TN	Knoxville, TN
Hale, Frank	UT Ag. Ext.	Nashville, TN
Hamilton, Steven W.	Austin Peay St. Univ.	Clarksville, TN
Harp, George	Arkansas State Univ.	Jonesboro, AR
Haun, Walker G. (Gray)	TN Dept. Agri.	Knoxville, TN
Heery, Frank	TN Dept. Agri.	Harrison, TN
Hendrix, Bill	Dow Elanco	Memphis, TN
Kauffman, Bruce W.	TN Dept. Ag. (Forestry)	Nashville, TN
Lambdin, Paris	Univ. of TN	Knoxville, TN
Latson, Larry N.	David Lipscom Univ.	Nashville, TN
Lentz, Gary L.	Univ. of TN	Jackson, TN
Mannion, Catharine	TSU	McMinnville, TN
Murphree, Steven C.	Belmont Univ.	Nashville, TN
Nabors, Ray A.	Univ. of MO	Portageville, MO
Pereira, Roberto	Univ. of TN	Knoxville, TN
Powell, Steve D.	TN Dept. Agri.	Nashville, TN
Snodderly, Lynn J.	TN Dept. Agri.	Knoxville, TN
Southards, Carroll	Univ. of TN	Knoxville, TN
Stewart, Randall	TN Dept. Agri.	Manchester, TN
Vail, Karen	Univ. of TN	Knoxville, TN
Williams, Harry E.	Univ. of TN (Ret.)	Knoxville, TN

Student Members

Baskauf, Steve	Vanderbilt Univ.	Nashville, TN
Bottomlee, Alan K.	Austin Peay St. U	Cedar Hill, TN
Brown, Scott	Austin Peay St. U	Cedar Hill, TN
Burns, Katrina	Univ. of TN	Knoxville, TN
Doungkeaw, Nongpanga	Univ. of TN	Knoxville, TN
French, Stephanie	Univ. of TN	Knoxville, TN
Gibbs, Melinda	Univ. of TN	Knoxville, TN
Gottfried, Kristy	Univ. of TN	Knoxville, TN
Harris, Jerry	Univ. of TN	Knoxville, TN
Hed, Bryan	Univ. of TN	Knoxville, TN
Mizell, Randy	Univ. of TN	Knoxville, TN
Moore, James	Austin Peay St. U	Cedar Hill, TN
Morris, Chris	Univ. of TN	Knoxville, TN
Moughler, Gary	Univ. of TN	Knoxville, TN
Parker, Michael	Univ. of Memphis	Memphis, TN
Puckett, Derek	Univ. of TN	Knoxville, TN
Obenauer, Peter T.	Univ. of TN	Knoxville, TN
Roberts, Dina L.	Univ. of Memphis	Memphis, TN
Stumpf, Christof	Univ. of TN	Knoxville, TN
Van Tol, Nancy	Univ. of TN	Knoxville, TN
Vlach, Josh	Univ. of TN	Knoxville, TN
Whiteley, Emily	Univ. of TN	Knoxville, TN
Wiggins, Greg	Univ. of TN	Knoxville, TN

Sustaining/Corporate Members

Norman K. Goldberg		
Lee Greer	Valent Corp	Dunlap, TN
William H. Hendrix		Memphis, TN
Badar Munir		Mt. Juliet, TN 37122
Clete Youmans	American Cyanamid	Dyersburg, TN

BOARD OF DIRECTORS

President - Frank Hale
Past President - Paris Lambdin
President Elect - Steve Murphree
Secretary - Gary Lentz
Treasurer - Harvey Barton
Editor - Gray Haun
Historian - Harry Williams
Member-at-Large - Hans Chaudhary
Member-at-Large - Cletus Youmans

COMMITTEES: 1996 - 1997

AUDITING

Cletus Youmans, Chair
Frank Hale
Randy Mizell

AWARDS

Steve Hamilton, Chair
Lynn Snodderly
Catharine Mannion
Pete Obenauer
Harry Williams
John Skinner
Karen Vail

CONSTITUTION/OPERATING PROCEDURES

Gary Lentz, Chair
Joe Dunn
Gene Burgess

LOCAL ARRANGEMENTS

Steve Powell, Chair
Jim Bogard
Frank Hale
Jim Cagle

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Hans Chaudhary
Reid Gerhardt
Jerome Grant
Gary Lentz
Cletus Youmans

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Lynn Snodderly
Harvey Barton

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Bruce Kauffman
Jim Eisler
Ray Nabors
Gene Burgess

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Jerome Grant
Steve Hamilton
Catharine Mannion
Reid Gerhardt

PUBLICATION/EDITORIAL

Gray Haun, Chair
Jerome Grant
Lynn Snodderly
Ray Nabors

PUBLICITY

Larry Latson, Chair
Gray Haun
Bill Hendrix
Steve Powell
Harold Bancroft

Tennessee Entomological Society

Prediction and Evaluation

Committee Report

October 16, 1997

**Jim Cagle - Chair
Committee Members:
Bruce Kauffman
Jim Eisler
Ray Nabors
Gene Burgess**

**INSECT PROBLEMS
1997**

**Bill Shamiyeh
Department of Entomology and Plant Pathology
The University of Tennessee, Knoxville, TN 37901-1071**

FORAGE CROPS

ALFALFA

Alfalfa Weevil: Alfalfa weevil larvae counts were moderate in plots in Springfield averaging 8.3 larvae/sweep and light in Springhill averaging 1.6 larvae/sweep.

FIELD CROPS

FIELD CORN

European Corn Borer: Infestation levels were light in Middle and East Tennessee.

Fall Armyworm: Populations were well below the economic threshold in Springfield, Greeneville and Crossville.

TOBACCO

Tobacco Aphid: Population densities of the red form were light in East and Middle Tennessee requiring only one insecticide application.

Flea Beetles: Populations were light in Middle and East Tennessee during the growing season.

*Budworms &
Hornworms:* Budworm populations were below the economic threshold in Greeneville and Springfield. Hornworm populations became heavy after topping at Springfield requiring one insecticide application.

VEGETABLE CROPS:

Snap Beans

Mexican bean beetle: Low population densities early in the season becoming heavier in late July and August.

European corn borer: Corn borer population densities were light during the growing season.

CABBAGE

Worm Complex: Pre-treatment counts at Crossville averaged 1.6 worm /plant in cabbage and remained heavy during the growing season.

TOMATO

Aphids & Hornworms: Populations were very light during the growing season.

POTATO

Colorado Potato: Populations were moderate during the growing season at the Plateau Beetle Experiment Station.

Wire Worms: Populations were heavy at Greeneville and Crossville causing extensive damage to the tubers.

FRUIT TREES

APPLE

Japanese Beetle: Beetle populations were moderate at Crossville with Apple trees and Ornamentals in 1997.

Mites: Two-spotted spider mite populations were light on apple trees late in the season averaging about 1.7 mites/ leaf in 1997 and became heavy later prior to picking. One application of Danitol was sufficient for effective control. Trees treated with Kelthane 50WP required a second application for adequate control.

INSECTS AFFECTING NURSERY, SOD AND AGRICULTURAL CROPS IN TENNESSEE – 1997

Gray Haun

Tennessee Department of Agriculture, Div. of Plant Industries
PO Box 40627 Melrose Station, Nashville, TN 37204

Boll Weevil

The boll weevil (*Anthonomus grandis* Boheman) has been a serious agricultural pest of Tennessee cotton since the early 1900's. According to the Tennessee Agricultural Statistics Service, 500,000 acres of cotton were planted in 1997, of which 490,000 acres were harvested. Production, consisting of 656,000 bales, was valued at \$209.4 million.

The Boll Weevil Eradication Program (BWEP) has been operational in Middle Tennessee counties since 1994. Intended planting of cotton was reported at 10,440 acres in the spring of 1997. However, an extremely cool and wet spring resulted in 2589 acres being destroyed, as growers opted for alternative crops. Final certified cotton acreage for Middle Tennessee was reported at 7851 acres - down 34% from 1996 when 11,781 acres of cotton were certified, and down 63% from 1995 when 20,940 acres were sprayed four times by the Southeastern Boll Weevil Eradication Foundation. This represents less than 1% of the cumulative acreage in Middle Tennessee. These figures indicate that the boll weevil is virtually eradicated in Middle Tennessee.

West Tennessee Expansion

The vast majority (98%) of Tennessee's cotton is grown in West Tennessee. A positive referendum was held in February of 1997 on the question of expanding the Boll Weevil Eradication Program into Region I of West Tennessee. Region I consists of those southernmost counties in West Tennessee which either border Mississippi or lie south of the Hatchie River, and are as follows: Tipton, Shelby, Fayette, Hardeman, McNairy and Hardin Counties in their entirety and that portion of Haywood County lying south of the Hatchie. A diapause spray program is slated for start up in early August of 1998 in Region I, where an average of approximately 195,000 acres of cotton has been grown over the past few years. (See map 1)

Exotic Moth Survey

A total of 113 traps in 38 counties were placed in 1997 for each of the following three exotic moth species: African Cotton Leafworm, Egyptian Cotton Leafworm, and False Codling Moth. No positive catches were found. Counties where traps were placed are as follows with all traps negative: Benton (1), Blount (2), Coffee (2), Crockett (4), Cumberland (3), Decatur (1), Dickson (1), Fayette (5), Franklin (2), Gibson (6), Giles (2), Greene (4), Hamilton (1), Hardeman (3), Haywood (6), Henry (1), Jefferson (1), Knox (5), Lake (1), Lauderdale (3), Lawrence (2), Lincoln (2), Madison (7), Maury (1), Meigs (1), Montgomery (2), Moore (2), Obion (5), Robertson (7), Rutherford (3), Shelby (8), Sumner (3), Tipton (4), Trousdale (4), Warren (2), Washington (1), Williamson (1), Wilson (4).

Gypsy Moth Program

Egg Mass Surveys

Egg mass surveys were carried out at six locations in four counties during the winter of 1996-97 (Hamilton, Sevier (3), Scott and Sullivan Counties). Sites in Hamilton, Scott and Sullivan Counties were positive, with the first two locations newly-infested.

Eradication Sites

A total of 3,017 traps were placed in 10 eradication sites in 1997, totaling 170 square miles. These traps caught 104 moths (35 moths in 1996). Two ground spray locations and one aerial treatment were conducted in May, 1997. Five sites had zero moth catches for two years in a row and were declared eradicated. Soybean oil treatments were carried out at two locations, while burlap banding was placed in four areas. Mass trapping occurred on seven sites.

The Grainger County infestation (Joppa/Washburn/Clinch Mountain) had no egg mass searches, burlap bands or insecticide applications in 1997. A delimiting trapping grid was conducted over 12 square miles involving 212 traps (16 traps/square mile). No moths were caught for the second year, and the area was declared eradicated.

A delimiting grid over 1.5 square miles involving 108 traps (16-36/square mile plus mass trapping) was placed in Rhea county (Laurel Brook). Zero moth catches occurred for the second year, and the area was declared eradicated.

An area of one square mile was delimited around a Maury County (Neapolis) trailer park with 45 traps (36 traps/square mile plus mass trapping). No moths were trapped for the second year, and the area was declared eradicated.

In Sevier County (Gatlinburg) in Riverside Campground. Trapping involved one square mile delimited with 40 traps (36 traps/square mile). Zero moth catches occurred for the second year, and the area was declared eradicated.

Following an aerial treatment of pheromone flakes (Disrupt II Hercon) in 1996, no moths were trapped for the first year in the Unicoi/Carter County (Scioto Road) infestation in 1997. Mass trapping and a nine square mile delimiting grid will be duplicated in 1998 (289 traps at 16 traps/square mile).

In White County (Eastland/Todd Town), 73 burlap bands caught no larvae. A two square mile delimiting area plus mass trapping (199 traps) detected 5 moths (no multiple catches), a reduction from the 1996 (6 moths). Mass trapping and delimiting trapping will continue in 1998 at the same level (16 - 36 traps/square mile).

The Newport KOA campground in Cocke County had two square miles delimited (56 traps at 16 - 36 traps/square mile). Zero moth catches occurred for the second year, and the area was declared eradicated.

In preparation for ground treatment, 15 egg masses were removed or sprayed with soybean oil at the Avoca School in Bristol (Sullivan County). A one acre site was sprayed twice with Foray 48B on

May 8 and 16 from the ground. Burlap bands (17) caught no larvae, and a nine square mile grid (16 traps per square mile plus mass trapping)) with 189 traps detected no moths for the first year.

Following the removal of three viable egg masses and one spent egg mass in November, 1996, 25 burlap bands were placed at the Hamilton County (Signal Mountain) site. No larvae were found and a six square mile grid (9-36 traps per square mile plus mass trapping) with 103 traps caught two moths on the fringes of the grid. Grid trapping will be expanded to include these new locations in 1998.

In January, 1997, egg mass removal and soybean oil treatments were completed on 3,345 egg masses (primarily one white oak) at the Scott County (Elgin) area. An Air Tractor AT-502-B sprayed 4,298 acres of private land twice with Foray 48B on May 7 and May 14-15 in cooperation with USDA Forest Service (USDAFS). Ground treatments with diflubenzuron were also conducted in the core area three times on one white oak in the yard and oaks along the forest edge. Burlap bands (100) and other locations caught 1,320 larvae in the core area through May 19 when all larval catches ceased. A total of 97 moths were trapped in 1,776 traps in a 126 square mile area (9-36 traps/square mile plus mass trapping) with seven moths caught in the spray block. A similar trapping grid will be used in 1998, and ground treatment of one location is being considered if egg surveys are positive.

Trapping (See maps 2 & 3)

TDA Regulatory Services (TDARS) under a cooperative agreement with USDA APHIS PPQ provided assistance with two ground treatment locations and hired 22 individuals to trap six existing infestations (Cocke, Hamilton, Maury, Sevier, Sullivan and White Counties) and urban areas (1 trap/square mile), campgrounds, mobile home sites and sawmills (selective trapping rates) statewide. In addition, they delimited 44 sites covering 47 square miles. TDARS hired an additional nine persons under an agreement with the USDAFS to delimit existing infestations in Grainger, Rhea, Scott, and Unicoi County. An additional six persons were hired by TDARS with state money to do detection trapping. TDA Forestry (TDAF) under a cooperative agreement with USDA APHIS PPQ trapped one half of each of 93 counties in the state at the rate of one trap per four square miles. USDA APHIS PPQ personnel trapped Davidson and Shelby Counties exclusively.

Detection Site Trapping

A total of 14,453 traps were placed statewide in 1997 to discover introductions of the gypsy moth into the State. These traps caught 65 moths, a total more than 1996 (63 moths). The State had fewer introductions (40) this year than last (45). Two counties (Overton and Van Buren) trapped moths for the first time. Over two-thirds (63) of the 95 counties in the State have had at least one moth trapped in them since the first moths were caught in 1972 in Cocke (1 moth) and Sevier (1 moth) Counties.

Nine areas of multiple moth sites caught 35 moths. The Overton County (Cooktown Road) location had the greatest number of moths (12) following an introduction from New York in one of three rural residential detection catches in the State. Other rural residential sites caught two and three moths in Anderson and Sevier Counties, respectively. The rest of the multiple catch sites were in six campgrounds in Davidson, Giles, Knox, Sevier, and Van Buren Counties and ranged from two to five moths per recreational area.

Delimiting Site Trapping

A total of 899 traps were placed in 44 delimiting sites in 1997 (16 traps/square mile). These locations evaluate sites where the gypsy moth was found in 1996 but was not established (no other life stages were found). Thirteen (13) areas were positive with 52 moths caught in a total of 15 square miles (2,451 moths in 1996).

The largest multiple catch site of six sites was in Fentress County (Elmore Road) where 19 moths were trapped on just over one square mile. Another rural residential delimiting site in Sevier County (Goose Gap Road) caught 12 moths on two square miles in a time-share housing area. Three moths were trapped in a residential site in Sullivan County (State Street-Bristol). Other multiple catch sites involved two to six moths trapped in each of three campgrounds in Davidson and Sevier Counties.

In 1998, 53 sites are proposed for delimiting trapping. Seven areas in six counties (Fentress, Overton, Scott, Sevier (2), White, and Van Buren) will have egg mass surveys during the fall and winter of 1997-1998.

Eradication Site Trapping

Five sites will be trapped in 1998 involving 154 square miles where gypsy moths were caught since 1996 and the insect was established (two or more life stages of the gypsy moth present). Additional sites may be added pending the results of the egg mass surveys.

Imported Fire Ant

Two species of the imported fire ant, *Solenopsis invicta* (red species) and *Solenopsis richteri* (black species) as well as their hybrid are established in parts of Tennessee. Inspections of nurseries, greenhouses, and plant dealers are made by the Tennessee Department of Agriculture (TDA), Plant Certification Section. This section also participates in survey, eradication, and suppression efforts against imported fire ants.

The following areas are under federal and state quarantine regulations to prevent the artificial spread of the imported fire ant into non-infested areas: (See map 4)

Bradley County. The entire county.

Chester County. The entire county.

Decatur County. That portion of the county lying south of Tennessee State Highway 100.

Fayette County. That portion of the county south of U.S. Highway 64. That portion also of the county lying east of Tennessee State Highway 76.

Franklin County. That portion of the county lying south of latitude 35' 05".

Giles County. That portion of the county lying south of U.S. Highway 64.

Hamilton County. That portion of the county lying south of U.S. Highway 64.

Hardeman County. The entire county.

Hardin County. The entire county.

Henderson County. That portion of the county lying south of Tennessee State Highway 100.

Lawrence County. That portion of the county lying south of U.S. Highway 64.

Lincoln County. That portion of the county lying south of latitude 35' 05".

Marion County. That portion of the county lying south of latitude 35' 10".

McMinn County. That portion of the county lying south of latitude 35' 20".
McNairy County. The entire county.
Polk County. The entire county.
Shelby County. That portion of the county lying south of latitude 35' 13".
Wayne County. The entire county.

Since 1994, new introductions of imported fire ants in counties other than those listed in the quarantine include the following: Anderson, Benton, Blount, Coffee, Davidson, Decatur, Dyer, Gibson, Haywood, Humphreys, Knox, Lewis, Madison, Marshall, Meigs, Marion, Monroe, Moore, Montgomery, Perry, Rutherford, Sequatchie, Sevier, Sumner, Unicoi, Warren, Washington, and Williamson.

Japanese Beetle

The Japanese beetle (*Popillia japonica*) became permanently established in the northeastern part of the State in the late 1960's. It continues to spread into more counties of West and Middle Tennessee. 812 traps were placed in West and part of Middle Tennessee in 1997.

Two counties: Henry and Lawrence plus a portion of Weakley (city limits of Greenfield) were added to the generally infested category in 1997.

Pine Shoot Beetle

A total of 55 traps were placed in 34 counties in 1997 with all traps negative (See map 12). Counties with traps placed were as follows: Anderson (1), Bledsoe (1), Blount (1), Campbell (1), Carroll (1), Carter (1), Cheatham (1), Coffee (2), Cumberland (1), Davidson (8), DeKalb (1), Franklin (2), Gibson (3), Giles (1), Grundy (1), Jefferson (1), Johnson (1), Knox (5), Lawrence (1), Lincoln (1), Maury (1), McMinn (2), Montgomery (1), Putnam (2), Robertson (1), Rutherford (2), Shelby (3), Sullivan (1), Tipton (1), Van Buren (1), Warren (2), Washington (1), Williamson (1), Wilson (1).

Pink Bollworm

A total of 426 traps were placed in 14 counties in 1997 with all traps negative (See map 13). Counties with traps placed were as follows: Carroll (28), Chester (6), Crockett (17), Dyer (47), Fayette (41), Gibson (48), Hardeman (16), Haywood (20), Lake (19), Lauderdale (60), Madison (36), McNairy (2), Shelby (21), Tipton (65).

Sweet Potato Weevil

In 1997, there were 327 acres of sweet potatoes grown in Tennessee. All farmers' markets and wholesale distributors in the state were trapped for Sweet Potato Weevil. Storage facilities for sweet potatoes are trapped on a year round basis. No positive catches were reported.

Apiary Annual Report

One thing that will probably stand out in many beekeepers' minds was the large amount of swarming seen in 1997. The long wet spring extending to the end of June probably contributed to this phenomenon (an abnormal year all around). The wet spell also contributed to the honey flows being pushed later into the summer, and many beekeepers did not get their honey off until up into August and even September. Consequently, many beekeepers were not able to put Apistan® strips in the colonies until this late in the season. This created a situation favorable for the Varroa mites, and a great deal of mite problems were seen throughout the state in late summer and through the fall. In the Fall, some people noticed that their best colonies died out from the mites early, while colonies that were started from swarms continued to make it into the winter. One possible explanation for this was that the swarms had broken the mite's life cycle by absconding and then started a new colony with a much lower mite population. Colonies that did not swarm remained with the ever-increasing mite population and in many cases died out in the late fall. I saw in West Tennessee in August during the soybean/cotton honey flow many colonies with young, mite-damaged bees. Also, I have received many reports and inspected many colonies this winter that appear to have died out from the mites.

Varroa mites and Apistan were the subject of a meeting at the USDA-ARS Beltsville Research Center in October 6, 1997. The purpose of the meeting was to discuss the reduced effectiveness of fluvalinate (the active ingredient in the Apistan® strips) on the Varroa mite in certain parts of the country. Varroa mites resistant to fluvalinate is a potential problem for Tennessee beekeepers in the future.

I did not see in 1997 as much evidence of tracheal mites ("K" wing bees) as I thought I might. Most beekeepers are using the vegetable shortening/ sugar patties and they seem to be working well in controlling the tracheal mites. Menthol helps to control the tracheal mites but its vaporization is temperature dependent and it can be toxic to the bees, so care must be used in using it. The vegetable shortening/ sugar patties are also used to deliver Terramycin to the bees for foulbrood (American and European) prevention and control. In 1997, the recommended amount of Terramycin (TM25) added to each patty was changed. This means that in whatever amount of patties are made, now add 1/3 more TM25.

During my inspections in 1997, I found American foulbrood in 8 counties in East and Middle Tennessee. I did not get a chance to inspect many colonies in West Tennessee so I will be starting there in the spring. The counties in which foulbrood were found were Cannon, Davidson, McMinn, Putnam, Sevier, Sumner, Unicoi, and Williamson. The Tennessee State Apiarist's report for colony inspections follows.

TENNESSEE STATE APIARIST REPORT: June 1997 - January 1998

Beekeeping Statistics

No. State Registered Beekeepers	543
No. State Registered Apiaries	827
No. State Registered Colonies	6575
No. Estimated Beekeepers	2000
No. Estimated Colonies	24000

Colony Inspections

<u>Inspections</u>	<u># Apiaries</u>	<u># Colonies</u>
Blount Co. (Joe Tarwater)	21	307
Campbell Co. (Paul Broyles)	14	31
Knox Co. (Tess Arnold)	5	25
Nashville (Paul Carter)	6	19
Sevier Co. (John Kelley)	~24	~100
Wilson Co. (Tom Hart)	6	38
State Apiarist (Ray McDonnell)	31	297
TOTAL	107	817

American Foulbrood Statistics

<u># Apiaries with AFB</u>	<u># Colonies in Apiaries with AFB</u>	<u># Colonies with AFB</u>
13	80	33

Percent Inspected Colonies with AFB	4.0%
Percent Registered Colonies with AFB	0.5%
Percent Estimated Colonies with AFB	0.1%

No. Apiaries Quarantined	13
No. Apiaries Released from Quarantine	0
No. Colonies Destroyed	29
No. Colonies Treated/Saved	4

Colonies entering the State (Certified) 12

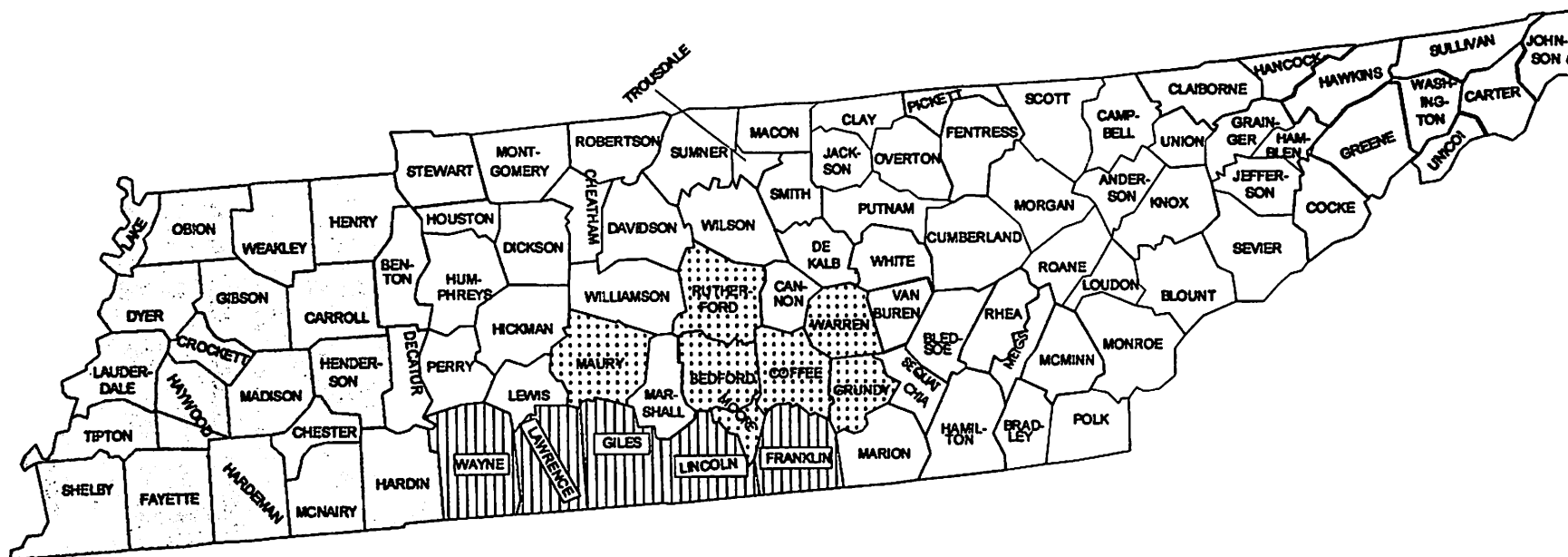
One location (Polk County) checked by request for Africanized honey bees.

USDA - APHIS personnel placed Africanized Bee traps out during the summer in areas that have high probability of traffic from Mexico and southwestern States. One swarm was retrieved and found not to be Africanized but European in nature.

TENNESSEE

Boll Weevil Eradication Program Sequence

43



1994 - Fall Diapause - Lower Middle Tennessee



1995 - Spring Trapping Program - Central Middle Tennessee

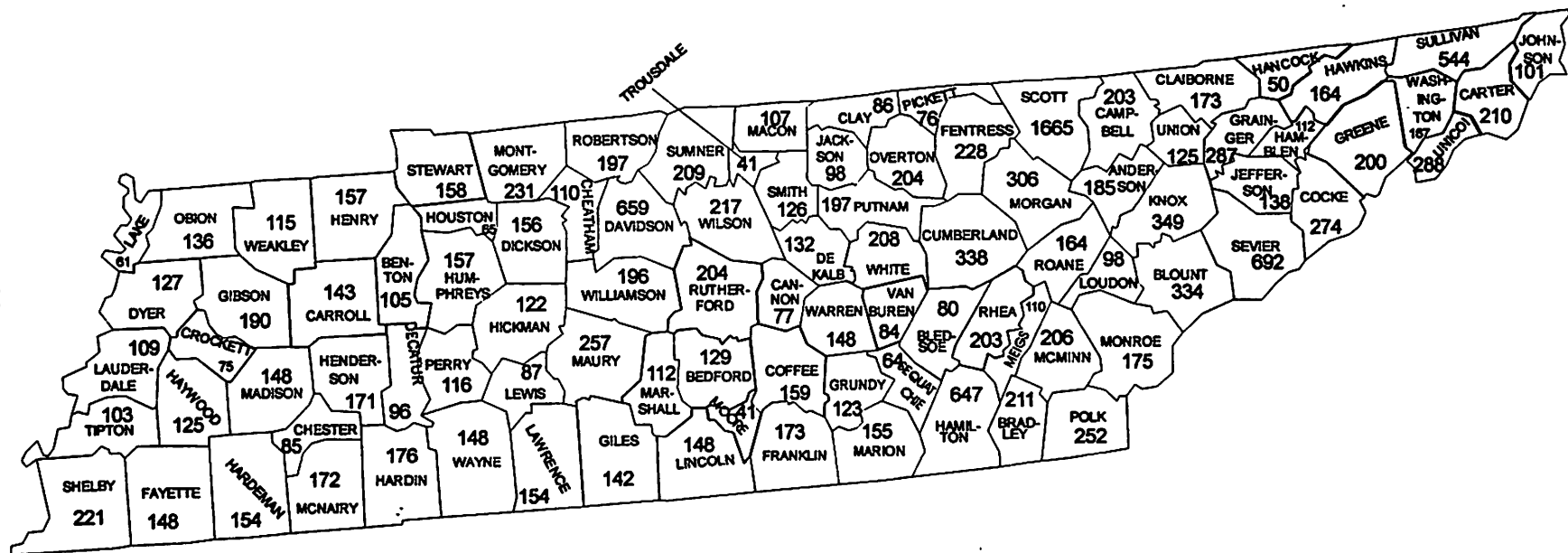


1998 - Fall Diapause - West Tennessee Region 1



???? - Remainder of West Tennessee

1997 TENNESSEE GYPSY MOTH TRAPPING PROGRAM

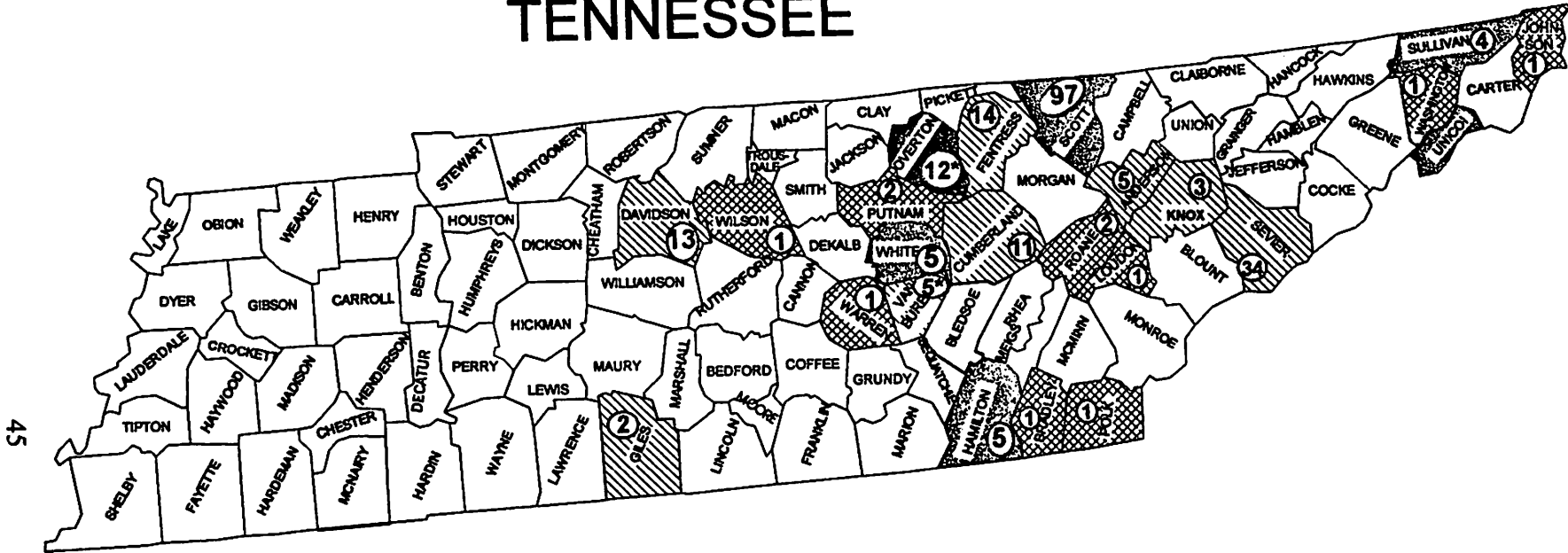


18,369 TRAPS PLACED

(DETECTION Trapping Only --14,453 Traps)

**Agencies Cooperating: TN Dep. of Agriculture, Divisions of Regulatory Services and Forestry;
 USDA APHIS PPQ; USDA Forest Service; USDI National Park Service;
 Tennessee Valley Authority; US Corps of Engineers; US Army;
 USDI Fish and Wildlife Service; US Air Force; US Department of Energy**

COOPERATIVE GYPSY MOTH SURVEY FY 1997 TENNESSEE



Gypsy Moth Catches by County - 1997 221 Moths

Traps with Multiple Catches

Anderson - 1	Giles - 1	Van Buren - 1
Cumberland - 2	Overton - 2	
Davidson - 2	Scott - 18	
Fentress - 2	Sevier - 5	
Knox - 1	Sullivan - 1	

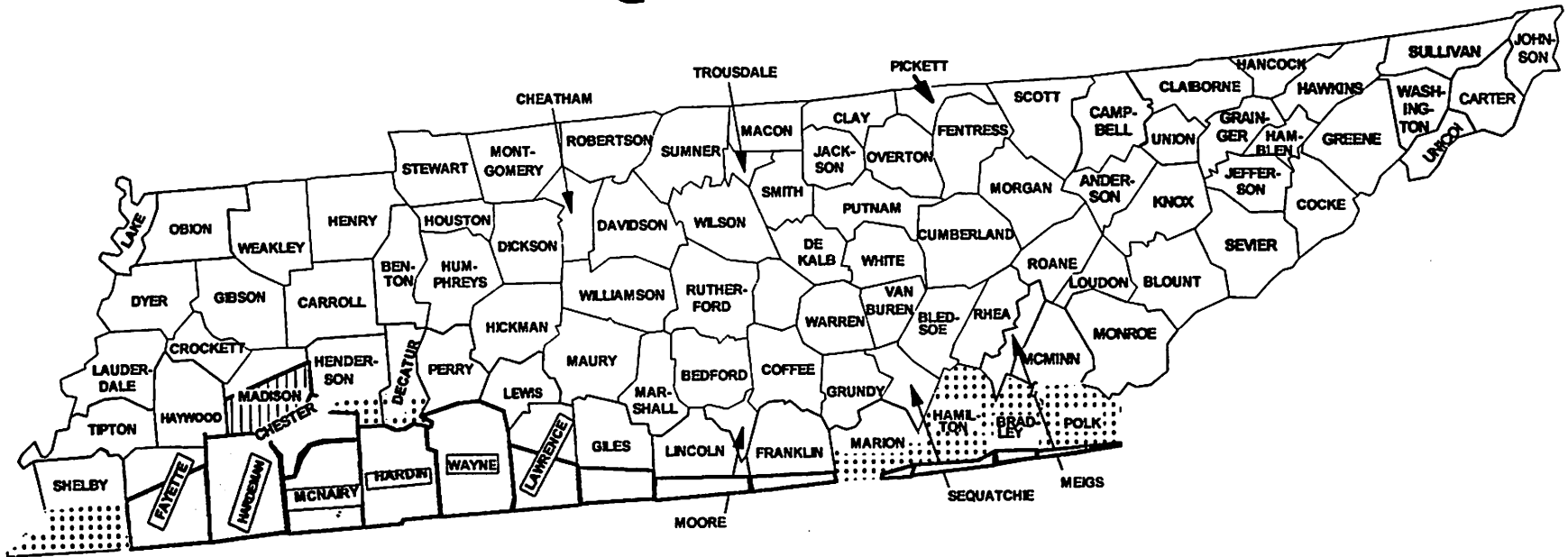
- = Number of Gypsy moths caught
- ▨ = Known Infested Counties
- ▩ = Single trap gypsy moth catches
- ▧ = Multiple gypsy moth catches in trap(s)
- * = New county record


Known Infestations

Hamilton	Sullivan
Overton	Unicoi
Scott	White

18,369 = Total Number of Traps set

1996-1998 TENNESSEE IFA Quarantine



-  Regulated Areas - 1996
-  Regulated Areas - 1997
-  Regulated Areas - 1998

Map 4

FOREST INSECT HIGHLIGHTS 1997

Bruce W. Kauffman
Tennessee Department of Agriculture, Division of Plant Industries
Box 40627, Melrose Station, Nashville, TN 37204

Southern pine beetle spots continued to be reported in southwestern Tennessee with Chester and Hardin Counties having the most activity. Following two aerial flights, over 6,500 infested trees (114 spots) were detected representing nearly 5,000 tons of pine timber.

Hackberry butterfly defoliation was noticeable in some areas of Middle Tennessee such as Rutherford County. Some trees were totally stripped by the caterpillar stage, and numerous butterflies were on the roads.

May beetle damage to pin oak, northern red oak and cucumber tree seedlings was reported this spring in areas with heavy fescue cover. Loblolly pine sawfly damage ceased by the end of May and was present in new areas of Smith and Wilson Counties. One forest landowner in Weakley County had 40 percent of a 10 year old loblolly pine plantation defoliated. Generally high levels of defoliation have only occurred for one year in most locations thereby reducing most impacts. Virginia pine sawflies were at lower levels on Christmas trees in Wilson County.

Eastern tent caterpillar populations reached higher levels than last year east of Nashville. Most areas of the Cumberland Plateau and East Tennessee had over 50 percent defoliation despite the erratic spring weather. Locust leaf miner damage to black locust was greater than 50 percent in many areas over the eastern half of the State. Variable oak leaf caterpillar and cherry scallop shell leaf roller damage was below damaging levels this year in comparison to last year.

Spider mites on spruce, hemlock, Fraser fir and Virginia pine Christmas and urban trees have been at higher levels this spring in Middle and East Tennessee. The extended growing season last fall enabled short-horned grasshoppers to lay a bountiful crop of eggs. This spring and summer 'hoppers are out in large numbers on the Cumberland Plateau feeding primarily on white oaks.

Exotic ambrosia beetles and associated fungi killed a 30 year old yellowwood in northern Middle Tennessee. This insect (*Xylosandrus crassculus*) migrated into the State from the Deep South.

**TENNESSEE SOYBEAN INSECT SUMMARY
1997**

**Ron Steward
University of Tennessee
Extension Entomologist**

Tennessee planted 1.32 million acres of soybeans in 1997, up 10% from 1996. Insect pressure was very light.

Three-cornered alfalfa hopper, common stalk borer and slugs were separately reported in isolated fields in Middle Tennessee.

Other general surveys found mostly green clover worm, a foliage feeder, at sub-threshold levels. No reports of pod feeders were received.

**TENNESSEE COTTON INSECT SUMMARY
1997**

**Ron Steward
University of Tennessee
Extension Entomologist**

Tennessee planted 510,000 acres in 1997 which was down 20,000 acres from 1996. Corn and soybeans took most of this acreage as the new farm bill was initiated. Average yield was projected at 605 lbs. Lint per acre.

Cool, damp weather was the dominant factor during planting and early development of the crop. Temperatures averaged 54, 64, and 73 degrees fro April, May and June respectively at Jackson - West Tennessee Experiment Station. These are 5, 3 and 2 degrees below normal. Rainfall totaled 5.6, 3.2 and 9.8 inches for the same period which collectively was 4.0 inches above normal with most of the excess in June. As a result of this unfavorable weather, very little cotton was planted in April. Conditions did improve during early May that provided a window in which most of the crop was planted. Unfortunately, poor growing conditions returned with even a lack of moisture briefly in some areas. Rain did return and cause some flooding and subsequent losses. Approximately 2000 acres were lost in Middle TN from water. Also weather related, hail damage claimed several hundred acres in Haywood and Crockett counties which were replanted

Thrips infestations were normal to above normal. Higher populations caused terminal damage which persisted through the 5-6 node stage. Poor growing conditions which resulted in poor root development was the primary reason. Poor root uptake reduced systemic action of seed treatments and in-furrow insecticides which required some additional foliar applications. Growers relying totally on foliar applications saw excessive damage and stunting in some fields. Most applications are applied with ground equipment and were delayed by wet conditions.

Overwintered boll weevil survival was greater than expected in West Tn. Pheromone trap captures were higher than previous '95-'96 records. Cool temps delayed weevil emergence. A significant increase in trap capture was not seen until late May and early June with peak emergence occurring June 20-27. This peak was about 14-21 days later than normal. Pinhead applications were recommended on all acreage with some areas encouraged to make two treatments, based on high trap captures. During peak emergence, the average number of weevils per trap ranged from 1.5 to 207 in Lake and Hardeman counties respectively. Some growers did not apply overwintered weevil sprays because of the dismal condition of the crop in the early stages. Although this caused some earlier F1 development, populations remained below standard economic thresholds on some of the acreage. Some of this was attributed to early plant bug applications which also gave boll weevil control.

Boll weevil trap captures and in-season infestations remain consistent with higher numbers in the southern counties and lower populations in northern counties in West TN. Again fro 1997, boll weevil will be ranked as the number one pest problem.

Middle Tennessee counties (7000 ac.) are weevil free after starting the eradication program in the fall of 1994.

Plant bug numbers thrived on the lush alternate host plants around field borders which also benefitted from rain. These high populations never completely left these host and moved into cotton although infestations were higher than 1996. Sweep net counts in bordering vegetation produced 100 plus plant bugs per 25 sweeps in some fields. Some early applications were targeted specifically for plant bugs but most were directed at boll weevil or the combination of the two.

Pre-bloom infestations of bollworm/budworm were minimal with very few acres treated during this time. Pheromone traps indicated a 70/30 ration of boll/budworm pre-bloom and a 60/40 ration post-bloom with a peak around August 10-15. Average trap captures were down approximately 80% for bollworm but up 65% for budworm from 1996. Treatable levels of larvae developed over more acres in late July and early August.

Control was achieved with one application in most cases and where numbers persisted, a second treatment gave satisfactory control. Pyrethroid control failures were not reported but many growers who have experienced problems in the past were making more tank mixtures with ovicides, phosphates or carbamates. Infestation were consistently higher in southern versus northern counties.

"Bt" cotton varieties accounted for about 27,000 acres. This was only 5.4% of total acres but was an increase from 10,000 reported in 1996. As seed for earlier maturing varieties is more available, acreage in the "worm problem" areas will likely increase. Bollworm control in "Bt" has been good and yields have been comparable to conventional varieties.

Aphid populations were very light overall. Little to no treatments were made. The pathogenic fungus helped naturally control most infestations.

Yellowstriped armyworm persisted throughout most of the season. Some feeding in squares but mostly in blooms was observed. Larval numbers were sometimes included in treatment thresholds.

European corn borer had some activity reported. Most reports were terminal damage with a few in bolls.

Fall armyworm were scattered with low numbers and very few acres treated.

HISTORICAL NOTES

Presidents of the Tennessee Entomological Society (1973 - Present)

<u>President</u>	<u>Term</u>	<u>Affiliation</u>
Mendell Snodgrass	'73 - '74	USDA
Omar Smith	'74 - '75	Memphis State University
Don Clements	'75 - '76	Cook's Pest Control
Gary Lentz	'76 - '77	University of Tennessee
Chester Gordon	'77 - '78	Tenn. Dept. of Agriculture.
Gene Burgess	'78 - '79	University of Tennessee
Reid Gerhardt	'79 - '80	University of Tennessee
Harold Bancroft	'80 - '81	Memphis State University
Joe Dunn	'81 - '82	American Cyanamid Company
Bill Van Landingham	'82 - '83	Tenn. Dept. of Agriculture
Carl Brown	'83 - '84	Memphis State University
Charles Pless	'84 - '85	University of Tennessee
Michael E. Cooper	'85 - '86	Tenn. Dept. of Agriculture
Elmo Shipp	'86 - '87	Mobay
Bill Shamiyeh	'87 - '88	University of Tennessee
Harvey Barton	'88 - '89	Arkansas. State University
Harry Williams	'89 - '90	University of Tennessee
Bruce Kauffman	'90 - '91	Tenn. Dept. of Agriculture
Jamie Yanes, Jr.	'91 - '92	American Cyanamid Company
Jerome Grant	'92 - '93	University of Tennessee
Russ Patrick	'93 - '94	University of Tennessee
Lynn Snodderly	'94 - '95	Tenn. Dept. of Agriculture
Paris Lambdin	'95 - '96	University of Tennessee
Frank Hale	'96 - '97	University of Tennessee

Secretary-Treasurers of the Tennessee Entomological Society (1973 - Present)

<u>Secretary-Treasurer</u>	<u>Term</u>	<u>Affiliation</u>
Jimmy White	'73 - '76	Tenn. Dept. of Agriculture
Harold Bancroft	'76 - '79	Memphis State University
Lyle Klostermeyer	'79 - '82	University of Tennessee
Bill Shamiyeh	'82 - '85	University of Tennessee
Richard Caron	'85 - '88	University of Tennessee
Richard Caron	'88 - '91	University of Tennessee

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Gary Lentz	'91 - '93	University of Tennessee
Gary Lentz	'93 - '98	University of Tennessee

Treasurers of the Tennessee Entomological Society (1991 - present)

<u>Treasurer</u>	<u>Term</u>	<u>Affiliation</u>
Harvey Barton	'91 - '94	Arkansas State University
Harvey Barton	'94 - '97	Arkansas State University

Editors of the Tennessee Entomological Society (1991 - present)

<u>Editor</u>	<u>Term</u>	<u>Affiliation</u>
Gray Haun	'91 - '92	TN Dept. of Agriculture
Gray Haun	'92 - '98	TN Dept. of Agriculture

**Board of Directors
Members at Large**

<u>Member</u>	<u>Term</u>	<u>Affiliation</u>
Gary Lentz	'87 - '88	University of Tennessee
Blake Bevill	'87 - '88	Arkansas State University
Michael E. Cooper	'88 - '89	TN Dept. Agriculture
Jay P. Avery	'88 - '89	University of Tennessee
Joe Dunn	'89 - '90	American Cyanamid Company
Charles Pless	'89 - '90	University of Tennessee
Paris Lambdin	'90 - '91	University of Tennessee
Jim Keener	'90 - '91	TN Dept. of Agriculture
Steve Powell	'91 - '92	TN Dept. of Agriculture
Lee Greer	'91 - '92	Valent
Alan Hopkins	'92 - '93	Miles, Inc.
Donald Ourth	'92 - '93	University of Memphis
Mark Carder	'93 - '94	University of Tennessee
Rich Emerson	'93 - '94	TN Dept. of Agriculture
Ray Nabors	'94 - '95	Univ. of MO
Alan Hopkins	'94 - '95	Miles, Inc.
Steve Powell	'95 - '96	TN Dept. of Agriculture
Jim Bogard	'95 - '96	TN Dept of Agriculture (Retired)
Hans Chaudhary	'96 - '97	TN Dept. of Agriculture
Cletus Youmans	'96 - '97	American Cyanamid

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Steve Powell	'95 - '96	TN Dept. of Agriculture
Jim Bogard	'95 - '96	TN Dept. of Agriculture (Retired)
Hans Chaudhary	'96 - '97	TN Dept. of Agriculture
Cletus Youmans	'96 - '97	American Cyanamid

**Historians of the Tennessee
Entomological Society (1973 - Present)**

<u>Historian</u>	<u>Term</u>	<u>Affiliation</u>
Charles Pless	'73 - '76	Univ. of Tennessee
Herb Morgan	'76 - '79	USDA
Mendell Snodgrass	'79 - '82	USDA
Russ Patrick	'82 - '87	Univ. of Tennessee
Russ Patrick	'87 - '92	Univ. of Tennessee
Harry Williams	'92 - '98	Univ. of Tennessee

**Honorary Members of the Tennessee
Entomological Society (1982 - Present)**

<u>Honorary Member</u>	<u>Year</u>	<u>Affiliation</u>
Jimmy White	1982	Tenn. Dept. of Agric.
Mendell Snodgrass	1983	USDA
Carl Brown	1985	Memphis State
Myrtice Snodgrass	1985	Knoxville, TN
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1990	American Cyanamid
Harry Williams	1997	Univ. of TN (retired)

**Howard Bruer Award (est. 1975)
Recipients of the Tennessee Entomological Society (1975 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Whitney Eckler	1975	Memphis, TN
Joe Martin	1976	Bolivar, TN
Bryan Peters	1977	College Grove, TN
Tidus Pollard	1978	Huron, TN
John Bentley	1979	??
Melissa Hart	1980	Watertown, TN
Gary Miller	1981	Knoxville, TN
Harold Glass	1982	Knoxville, TN
-----	1983	(No award given)
-----	1984	(No award given)
Penny Thompson	1985	Davidson County
Matthew Fumich	1986	Munford, TN
Christie Greer	1987	Greene Co.
Dottie Hodges	1988	Hamblen Co.
-----	1989	(No award given)
Tim Gentry	1990	Woodbury, TN
Jennifer Hartsell	1991	Hamblen Co.
Jessica Taylor	1992	Lincoln Co.
Jennifer Lenter	1993	Fayetteville Co.
Jeremy Smith	1994	Savannah Co.
George Carroll	1995	Anderson Co.
Stacy Milhahn	1996	Lincoln Co.
Nancy Warden	1997	Marshall Co.

**Outstanding Entomologist (Tennessee Entomologist of the Year)
Award (est. 1981) Recipients of the Tennessee
Entomological Society (1981 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Myron Smith	1981	Hill Smith Pest Control
Harry Williams	1985	Univ. of Tennessee
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1991	American Cyanamid

Richard E. Caron Outstanding Entomologist Award

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Harry Williams	1995	Univ. of TN (Retired)
Harvey Barton	1996	Arkansas State Univ. (Retired)
Carroll Southards	1997	Univ. of TN (Retired)

**Graduate Student Award (est. 1986) Recipients of the
Tennessee Entomological Society (1986 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Jay Avery	1986	Knoxville, TN
Laura Rogers	1987	Knoxville, TN
Jason Oliver	1988	Knoxville, TN
Steve D. Powell	1989	Knoxville, TN
Robert C. Brown	1990	Knoxville, TN
Donald L. Sudbrink, Jr.	1991	Knoxville, TN
Deborah Landau	1992	Knoxville, TN
Deanna Colby	1993	Knoxville, TN
Lee Holt	1994	Knoxville, TN
Kenneth Copley	1995	Knoxville, TN
Dina Roberts	1996	Memphis, TN
Bryan Hed	1997	Knoxville, TN

**CONSTITUTION
of the
TENNESSEE ENTOMOLOGICAL SOCIETY
(as of October 1991)**

Article 1. Name

This Society is formed in the name and style of the "Tennessee Entomological Society", as an educational institution, not contemplating financial gain or profit. It is herein and after called the Society.

Article 2. Purpose

The purpose and object of the Society is to foster entomological accomplishment among its members and to promote the welfare of all of the State of Tennessee through the encouragement of: (1) the preparation, reading, and/or publication of papers, (2) association and free discussion among all members, (3) the dissemination of entomological information to the general public, and (4) cooperative efforts in statewide insect surveys.

Article 3. Membership

Section 1. Original Members: Any person designated at the organizational meeting of the Society to occupy the status of "Member" shall be considered as and be a Charter Member. Thereafter, the organizational membership shall have no authority to name or appoint members of the Society.

Section 2. Membership: Membership shall be open to all persons interested in Entomology.

Section 3. Sustaining Membership: Sustaining Membership is open to commercial or industrial organizations upon meeting approval and requirements of the Board of Directors.

Section 4. Honorary Membership: Honorary Members may be selected from time to time by a majority vote of the Board of Directors.

Section 5. Student Membership: Student Membership is open to students enrolled in any education institution and meeting the requirements of the Board of Directors.

Section 6. Procedure to Obtain Membership: Any person desiring to become a member of the Society shall do so by application and payment of dues to the Treasurer. After approval of the majority of the Board of Directors, said applicant shall become a duly constituted member.

Section 7. Members in Good Standing: A member who is current in payment of dues.

Article 4. Membership Rights

Section 1. Voting: Each member in good standing shall be entitled to one vote at any regular or special meeting or by mail. Voting by proxy shall not be allowed.

Section 2. Privileges: All members in good standing shall have equal privileges in the presentation of papers and discussions at meetings.

Article 5. Membership Certificates

Section 1. Certificates: The Board of Directors shall decide upon what evidence of membership each member in good standing shall be entitled to receive.

Section 2. Transfer: Evidence of membership in the Society will not be transferable or assignable.

Article 6. Dues

Section 1. Annual Dues: The amount of the annual dues for membership in the Society will be established by the Board of Directors from time to time. The use or uses of dues collected shall also be determined by the Board.

Section 2. Time of Payment: The Board of Directors shall set such times during each year as it deems advisable for the payment of annual dues by members. Generally, annual dues shall be paid during registration at the annual meetings. However, a member may mail dues to the Treasurer of the Society if the member cannot attend a given annual meeting. If a member fails to pay dues two (2) years in a row, such member shall be dropped from the rolls.

Section 3. Honorary Members: There shall be no dues required for Honorary Members or others specially designated by the Board of Directors.

Article 7. Meetings of the Society

Section 1. Annual Meetings: The Society shall hold annual meetings at such times and places as may be designated by the Board of Directors and specified in the notice thereof, for the election of officers and any other business as may be properly brought before the meeting.

Section 2. Registration Fee: A registration fee, in the amount to be determined by the Board of Directors, shall be paid at each annual meeting by all members and non-members who attend. The Board of Directors will determine the use of these fees.

Section 3. Special Meetings: Special meetings of the Society shall be held at any time and place as specified in the notice thereof whenever called by the President or any two (2) or more members of the Board of Directors.

Section 4. Notice: Notice of all meetings of the Society, annual or special, stating time, place, and agenda shall be mailed to each member by the President, Secretary, Treasurer, or Directors calling the meeting not less than seven (7) days prior to the meeting.

Article 8. Officers

Section 1. Officers: The officers of the Society shall consist of a President, President-elect, Secretary, Treasurer, Editor, and Historian, all of whom, except the President, shall be elected by and from the membership by a majority vote of members or by mail. The first President of the Society shall be elected by and from the membership at the organizational meeting for a term extending to the beginning of the first annual meeting. Thenceforth, the President-Elect shall automatically accede to the office of President at each annual meeting, or when the President is unable or unwilling to act for any reason. Nominees for each elective office of the Society shall be selected by a nominating committee of three (3) members appointed at the annual meeting by the President. Nominations may also be presented from the floor. The President and President-Elect shall hold office from the date of election at the annual meeting until the election of their successors at the next annual meeting, and shall not be eligible for re-election to the same office for a successive term. The Secretary, Treasurer, and Editor shall hold office from the date of election at the annual meeting until the election of a successor at the third following annual meeting and shall be eligible for re-election. The Historian shall hold office from the date of election at the annual meeting until the election of a successor at the fifth following annual meeting and shall be eligible for re-election. No member shall occupy more than one office at any one time.

Section 2. Duties and Powers of the President: The President shall be the Chief Executive Officer of the Society and shall preside at all meetings of the Society and the Board of Directors, have and exercise general and active management of the Society, execute and enforce all orders and resolutions and regulations duly adopted by the Board of Directors, execute all contracts in the name of the Society, and perform such other duties as assigned by the Board of Directors.

Section 3. Duties and Powers of the President-Elect: In the absence of the President, or in the case of failure to act, the President-Elect shall have all the powers of the President and shall perform such other duties as shall be imposed by the Board of Directors from time to time.

Section 4. Duties and Powers of the Secretary: The Secretary shall attend and keep the minutes of all meetings of the Board of Directors and the Society, shall have charge of the records and seal of the Society, and shall, in general, perform all the duties incident to the office of Secretary of the Society.

Section 5. Duties and Powers of the Treasurer: The Treasurer shall keep full and accurate accounts of the books of the Society and shall deposit all monies and the valuable properties and effects in the name of and to the credit of the Society in such depository or depositories as may be designated by the Board of Directors. The Treasurer shall disperse funds as may be ordered by the Board, getting proper receipts for such disbursements; and shall render to the Board of Directors whenever required by it, an accounting of all transactions as Treasurer. During each annual meeting, the Treasurer shall give a report on the annual financial condition

of the Society. The Treasurer shall, in general, perform all the duties incident to the office of Treasurer of the Society.

Section 6. Duties and Powers of the Editor: The Editor shall be a member of the Board of Directors and Chair of the Publication and Editorial Committee and be responsible for editing and publishing such publications as directed by the Board of Directors and passed by the majority of the voting membership at a called meeting.

Section 7. Duties and Powers of the Historian: The Historian shall maintain and be responsible for keeping a complete and accurate history of the activities of the Society from year to year.

Section 8. Vacancies in Office: Any vacancy in the office of President-Elect, Secretary, Treasurer, Editor, or Historian, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors. Should an office be filled by vote of the Board of Directors, the person so elected shall not become the officer upon the next annual meeting unless elected as such by the Society according to the procedures set forth for the election of officers of the Society in Article 8, Section 1, of this Constitution.

Article 9. Board of Directors

Section 1. Makeup and Responsibilities: The Board of Directors shall consist of the immediate past-President, the President, President-Elect, Secretary, Treasurer, Editor, and Historian of the Society and two members-at-large. The members-at-large shall be elected at the Annual Meeting of the Society and shall serve a term of one year. Any three (3) Directors shall constitute a quorum for the transaction of business. All properties, property rights, objects and purposes of the Society shall be managed, promoted, and regulated generally by the Board of Directors.

Section 2. Installation and Term of Office: The members of the Board of Directors shall be installed after their election as officers of the Society as set forth in Article 8, Section 1, of this Constitution, at the annual meeting of the Society, or at any adjourned meeting, or at any special meeting called for that purpose. All installed Directors shall serve for a term corresponding to that of the office in the Society to which each was elected by the members and thereafter until their successors are elected, accept office, and are installed.

Section 3. Annual Meetings: The Board of Directors shall meet immediately after the adjournment of the annual meeting of the members for the transaction of such business as may come before the Board. No notice of such meeting shall be required, and should a majority of the newly-elected Directors fail to be present, those present may adjourn, without further notice to a specified future time.

Section 4. Other Meetings: The Board of Directors shall not be required by this Constitution to hold regular meetings but may, by resolution or otherwise, establish such order of meetings as it deems desirable. Special meetings of the Board shall be held at any time at such places as may be specified in the notice thereof, whenever called by the President or any two (2) or more Directors.

Section 5. Notice: Notice of all meetings of the Board of Directors, other than the annual meeting, starting time, place, and agenda for which the meeting was called, shall be given to each Director by the President or Directors calling the meeting not less than three (3) days prior to the meeting.

Section 6. Vacancies in Board of Directors: Any vacancy in the office of any Director, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors.

Article 10. Miscellaneous Provisions

Section 1. All checks and drafts shall be signed in such manner as the Board of Directors may from time to time determine.

Section 2. At all duly constituted meetings of the Society or Board of Directors of the Society, 10% of the eligible members, or 3 Directors, respectively, present shall constitute a quorum for the transaction of any business presented at such meetings.

Section 3. All notices required to be given by this Constitution relative to any regular or special meeting of the Society or the Board of Directors may be waived by the Directors or members entitled to such notice, either before or on the date of the meeting and shall be deemed equivalent thereto. Attendance at any meeting of the Society or the Board of Directors shall be deemed a waiver of notice thereof.

Section 4. General Prohibitions: Notwithstanding any provision of this Constitution and By-Laws which might be susceptible to a contrary construction. A. No part of the activities of the Society shall consist of carrying on propaganda, or otherwise attempting to influence legislation. B. This Society shall not participate in, or intervene in, (including the publishing or distribution of statements), any political campaign on behalf of a candidate for public office.

Article 11. Amendments

Section 1. This Constitution may be altered or amended or By-Laws adopted by a majority vote of the quorum present at any annual or special meeting of the Society membership, provided that notice of such proposed amendment or By-Laws shall have been given to the membership prior to the meeting.

1. Dates ('96), ('97) refer to last meeting attendance or last dues payment.
(**\$5.00 Regular, \$1.00 Student, \$25.00 Sustaining/Corporate**).

2. **H = Honorary Member**

TENNESSEE ENTOMOLOGICAL SOCIETY

MEMBERSHIP LIST

OCTOBER 1997

- | | | | |
|-----|---|-----|---|
| '97 | Harold Bancroft
Dept. of Biology
University of Memphis
Memphis, TN 38152
(901) 678-2592
Fax (901) 678-4746
bancroft@msuvx1.memphis.edu | '97 | Alan K. Bottomlee
3701 Oakwood Church Rd.
Cedar Hill, TN 37032
(615) 696-8190 |
| '97 | Harvey E. Barton
909 Chestnut
Jonesboro, AR 72401
(870) 932-4347
genbar@arkansas.net | H | Carl D. Brown
Dept. of Biology
University of Memphis
Memphis, TN 38152
(901) 678-2963
Fax (901) 678-4746 |
| '97 | Steve Baskauf
102 Keri Drive
Pleasant View, TN 37146
(615) 746-2748
Baskausu@ctrvax.vanderbilt.edu | '97 | Scott Nolan Brown
2323 South Virginia St. Apt. A2
Hopkinsville, KY 42240
(502) 885-8130 |
| '97 | Cindy Bilbrey
3032 Kent Road
Nashville, TN 37214
(615) 316-0543 | H | Howard L. Bruer
1604 Green Hills Dr.
Nashville, TN 37215
(615) 269-9740 |
| '97 | James Bilbrey, Jr.
P.O. Box 148546
Nashville, TN 37214
(615) 316-0543 | '97 | Edward E. (Gene) Burgess
Ent. and Plant Pathology
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7138
gburgess1@utk.edu |
| '97 | James B. Bogard
TDA Plant Industries Division
Box 40627, Melrose Station
Nashville, TN 37204
(615) 360-0130 | '97 | Katrina C. Burns
Ent. and Plant Pathology
The Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
bkItrina@utk.edu |

- '97 Jimmy L. Cagle
P.O. Box 341
Winchester, TN 37398
(615) 967-1240
jcagle@edge.net
- '97 Hans R. Chaudhary
313 Carroll Road
Harriman, TN 37748
(423) 882-3144
(423) 594-8900 (FAX)
- '97 Charley A. Chilcote
Ent. and Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-4979
(423) 974-4744 (FAX)
chilcote@utk.edu
- '97 Kyung Tae Chung
Dept. Of Microbiology &
Molecular Cell Sciences
The Univ. Of Memphis
Memphis, TN 38152
(901) 678-2955
ktchung@cc.memphis.edu
- '96 Bruce A. Cole
475 Margaret Circle
McMinnville, TN 37110
(615) 473-4145
- '97 Kenneth J. Copley
6355 Newstone Drive
Bartlett, TN 38135
(901) 380-2024
- '97 Sylvester Davis
922 Kelly-June Drive
Mount Juliet, TN 37122
(615) 754-6095
- '97 Nongpanga Doungkeaw
Ent. and Plant Pathology
The Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
- H Joe C. Dunn
724 Brownlee Drive
Nashville, TN 37205
(615) 352-5669
- '97 James I. Eisler
1081 Wheeler Rd.
McMinnville, TN 37110
(615) 473-4145
- '97 David Ekkens
Southern Adventist Univ.
Biology Dept.
Box 370
Collegedale, TN 37315
dekkens@southern.edu
- '97 Rich Emerson
TN Dept. Agr.
506 Airways Blvd.
Jackson, Tn 38301
(901) 423-5647
- '97 Stephanie C. French
Ent. and Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
sfrench@utk.edu
- '97 Reid R. Gerhardt
Ent. and Plant Pathology
Univ. of TN,
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
rgerhard@utk.edu
- '97 Melinda M. Gibbs
Ent. and Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-8682 (FAX)
mgibbs2@utk.edu

- '97 **Kristy Gottfried**
Ent. and Plant Pathology
Univ. of TN,
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
kristyL@utkux.utcc.utk.edu
- '97 **Jerome F. Grant**
Ent. and Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-3632
(423) 974-8682 (FAX)
jgrant@utk.edu
- '96 **Lee Greer**
Valent
Box 544
Dunlap, TN 37327
(615) 949-2747
- '97 **Frank Hale**
PO Box 110019
Nashville, TN 37222
(615) 832-6802
(615) 781-2568
- '97 **Steven W. Hamilton**
Dept. Of Biology
Austin Peay St. Univ.
Clarksville, TN 37044
(931) 648-7783
(931) 648-5996 (FAX)
hamiltonsw@apsu.edu
- H John A. Hammett**
6013 Apache Tr.
Knoxville, TN 37920
(423) 579-1627
- '97 **George Harp**
3206 Maplewood Terrace
Jonesboro, AR 72401
(870) 972-3082
(870) 972-2638 (FAX)
glharp@astate.edu
- '97 **Walker G. (Gray) Haun**
TN Dept. of Ag.
Div. of Plant Industries
PO Box 40627 Melrose Sta.
Nashville, TN 37204
(615) 837-0665
haunw@usit.net
- '97 **Bryan Hed**
Ent. and Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-8682 (FAX)
mcbhed@utkux.utcc.utk.edu
- '96 **Frank L. Heery**
6677 Harrison Hghts. Dr.
Harrison, TN 37341
(423) 344-7186
- '96 **Bill Hendrix**
1806 Peabody Ave.
Memphis, TN 38104
(901) 278-8180
hzea@ix.netcom.com
- '96 **Randy Sherman Jones**
Ent. & Plant Pathology
Univ. of TN
PO Box 1071
Knoxville, TN 37901-1071
(423) 974-3631
(423) 974-8682
- '97 **Karl H. Joplin**
Dept of Biological Sciences
Box 70703
ETSU
Johnson City, TN 37614
(423) 439-6921
- '97 **Bruce W. Kauffman**
TDA
Div. of Forestry
Box 40627, Melrose Sta.
Nashville, TN 37204
(615) 360-0176

- '97 Paris L. Lambdin
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-8682 (FAX)
plambdin@utk.edu
- '97 Larry N. Latson
David Lipscomb Univ.
3901 Granny White Pike
Dept. of Biology
Nashville, TN 37204
(615) 269-1000
- '97 Gary L. Lentz
Ent. and Plant Pathology
605 Airways Blvd.
Jackson, TN 38301
(901) 424-1643
(901) 425-4760
gll5405@erc.jsc.ccc.tn.us
- '97 Catharine Mannion
TN Nursery Crop Res. Stat.
472 Cadillac Lane
McMinnville, TN 37110
(931) 668-3572
(916) 668-3134
entomology@blomand.net
- '96 Eric John Marsland
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
- '97 Raymond E. McDonnell
2354 Walker Ford Rd.
Maynardville, TN
(423) 594-6098
mcdonnel@usit.net
- '97 R. G. Milan
5140 Hilson Rd.
Nashville, TN 37211
(615) 781-5477
- '97 Randy Mizell
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-3631
(423) 974-8682 (FAX)
gaucho@utkx.utcc.utk.edu
- '97 James P. Moore
700 Tylertown Rd.
Clarksville, TN 37040
(931) 553-0119
jpm8910@apsu01.apsu.edu
- '97 Christopher G. Morris
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
cgmorris@utk.edu
- '97 Gary B. Moughler
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-3632
(423) 974-8682 (FAX)
moughler@utk.edu
- '97 Badar Munir
210 Gilley Road
Mt. Juliet, TN 37122
(615) 758-4603
asawan@bellsouth.net
- '97 C. Steven Murphree
Biology Dept.
Belmont University
1900 Belmont Blvd.
Nashville, TN 37212-3757
(615) 460-6221
(615) 460-5458 (FAX)
murphrees@belmont.edu

- '96 **Ray Nabors**
Rt 3
Portageville, MO 63873
(573) 333-0258
- '97 **William D. Noon**
P.O. Box 140851
Nashville, TN 37214
- '97 **Peter J. Obenauer**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
pobenaue@utk.edu
- '97 **Donald D. Ourth**
Dept. Microbiology &
Molecular Cell Sci.
Univ. Of Memphis
Memphis, TN 38152
(901) 678-2950
ddourth@mem.edu
- '97 **Michael S. Parker**
The Univ. of Memphis
Dept. Of Microbiology &
Molecular Cell Sciences
Memphis, TN 38152
(901) 678-2955
michaelsparker@msn.com
- '96 **Kelly Silas Parman**
PO Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
- '97 **Roberto Pereira**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7955
(423) 974-4744 (FAX)
rpereira@utk.edu
- '97 **Charles D. Pless**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7136
(423) 974-4744 (FAX)
- '97 **Steve D. Powell**
TDA, Ellington Agri. Center
Div. of Regulatory Services
Box 40627, Melrose Station
Nashville, TN 37204
(615) 837-5139
agplant@mail.state.tn.us
- '97 **Derek Lee Puckett**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-3632
(423) 974-8682 (FAX)
dpuckett@utk.edu
- '96 **Tanisha Richmond**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
- '96 **Dina L. Roberts**
Dept. of Biology
Univ. of Memphis
Memphis, TN 38152
(901) 678-3372
dlroberts@cc.memphis.edu
- '97 **Ron Seward**
605 Airways Blvd.
Jackson, TN 38301
(901) 425-4718

- '97 **John Skinner**
218 Ellington Hall
University of TN
Knoxville, TN 37901-1071
(423) 974-7138
jskinner@utk.edu
- '97 **Lynn J. Snodderly**
TDA
Div. of Plant Industries
3211 Alcoa Hwy
Knoxville, TN 37920
(423) 594-6098
bluedot@usit.net
- H **Mendell E. Snodgrass, Sr.**
228 Pat Road
Knoxville, TN 37922
(423) 966-7259
- '97 **Keith Snyder**
Biology Dept.
Southern Adventist Univ.
P.O. Box 370
Collegedale, TN 37315
(423) 238-2929
kasnyder@southern.edu
- '96 **Carroll J. Southards**
Ent. and Plant Pathology
P.O. Box 1071
University of TN
Knoxville, TN 37901-1071
(423) 974-7136
(423) 974-4744 (FAX)
csouthar@utk.edu
- '96 **Randall T. Stewart**
TDA
Div. of Plant Industries
1208 Oak Drive
Manchester, TN 37355
(615) 723-0474
- '97 **Christof Stumpf**
Dept. Ent. & Pl. Sci.
UT Knoxville
PO Box 1071
Knoxville, TN. 37901
(423) 974-3632
(423) 974-8682 (FAX)
cstumpf@utk.edu
- '97 **Don Sudbrink**
University of TN
Plant & Pest Diagnostic Ctn.
5201 Marchant Drive
Nashville, TN 37211-5112
(615) 832-6802
pestlabnshvl@cru.gw.utk.edu
- '97 **Karen Vail**
Ext. Ent. & Plant Path.
P.O. Box 1071
University of TN
Knoxville, TN 37901-1071
(423) 974-7138
kvail@utk.edu
- '97 **Nancy Van Tol**
427 Arlington Ave.
Jackson, TN 38301
(901) 424-1643
vantol@usit.net
- '97 **Joshua J. Vlach**
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-8682 (FAX)
- '97 **Charles Watson, Jr**
300 Royal Oaks Blvd. #207
Franklin, TN 37067
(615) 791-6469
pracladius@aol.com

- H** Jimmy R. White
Rt. 5, Box 300
Brownsville, TN 38012
(901) 772-1919
- '97 Emily C. Whiteley
Ent. & Plant Pathology
Univ. of TN
P.O. Box 1071
Knoxville, TN 37901-1071
(423) 974-7135
(423) 974-4744 (FAX)
ewhitele@utk.edu
- '96 Greg Wiggins
Ent. & Plant Path.
Univ of TN Knoxville
PO Box 1071
Knoxville, TN 37901-1071
(423) 974-3631
(423) 974-8682 (FAX)
- H:** Harry E. Williams
1005 Francis Road
Knoxville, TN 37909
(423) 690-3069
- '97 Robert L. Williams
1850 Fayetteville Hwy.
Belfast, TN 37019
(931) 276-2754
- '96 Aaron Womble
8577 Cordes Circle
Germantown, Tn 38139
(901) 753-6113
- '97 Cletus Youmans
American Cyanamid
2152 Indian Trace
Dyersburg, TN 38024
youmansc@pt.cyanamid.com

Sustaining Members ('97)

Norman K. Goldberg

Lee Greer
Valent

William H. Hendrix
1806 Peabody Ave.
Memphis, TN 38104
(901) 278-8180
hzea@ix.netcom.com

Badar Munir
210 Gilley Road
Mt. Juliet, TN 37122
(615) 758-4603
asawan@bellsouth.net

**Application for Membership in the
TENNESSEE ENTOMOLOGICAL SOCIETY**

I (we), herewith, submit this application for membership in the Tennessee Entomological Society. Society pins are available to members for \$10.00.

PLEASE PRINT

Name of Prospective Member _____

Affiliation _____

Address _____ Zip Code _____

Phone Number _____ Area Code () _____

FAX Number _____ Area Code () _____

email address _____

Occupation _____

Please Check

Annual Dues \$5.00

Society Pin \$10.00

Annual Due for Students \$1.00

Sustaining Member Dues \$25.00

Amount Enclosed _____

Please Remit to:

Dr. Gary Lentz
Dept. Entomology and Plant Pathology
605 Airways Blvd.
West Tennessee Experiment Station
Jackson, TN 38301