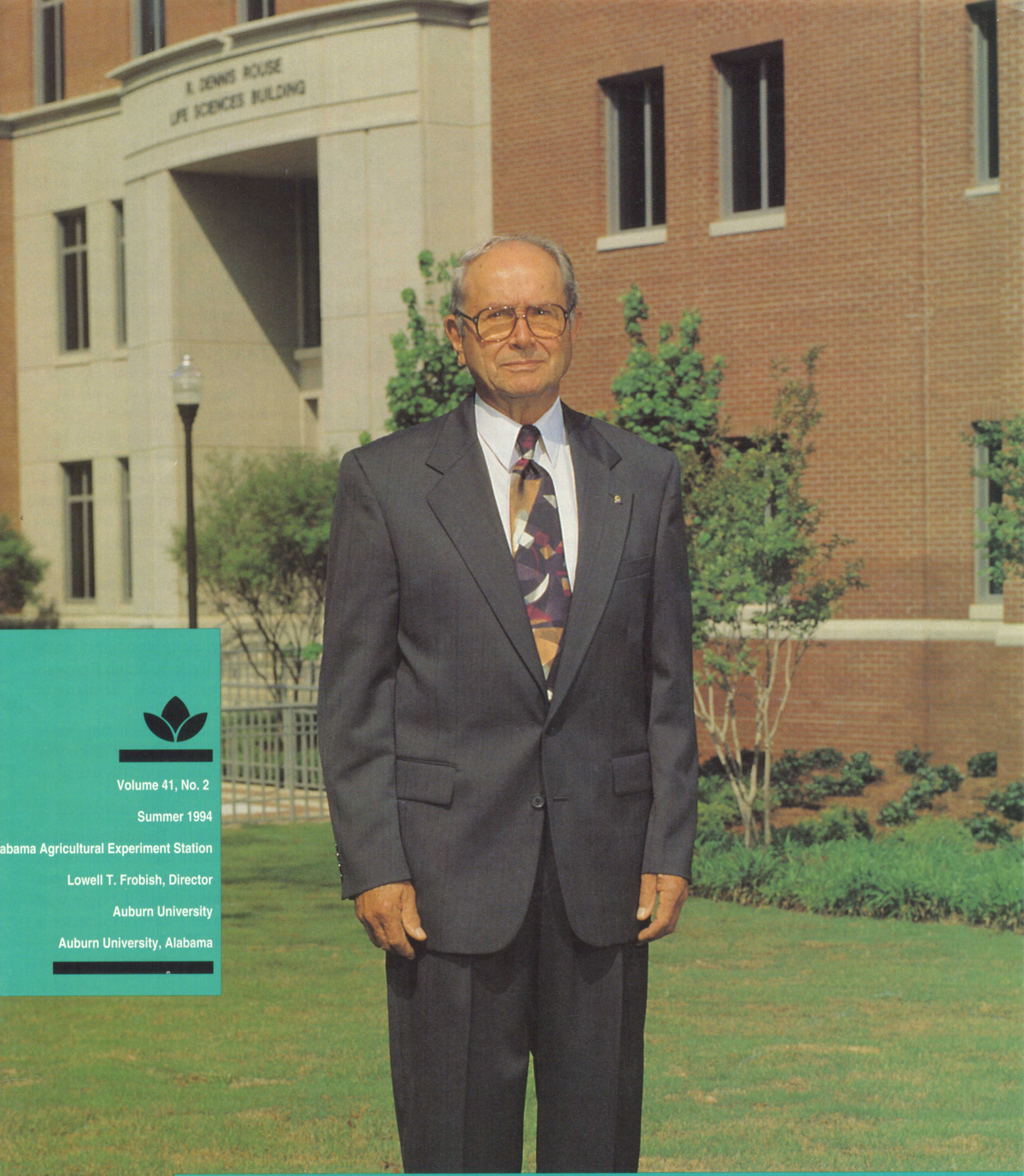


Volume 41, No. 2

Summer 1994

abama Agricultural Experiment Station

Lowell T. Frobish, Director

Auburn University

Auburn University, Alabama

HIGHLIGHTS

OF AGRICULTURAL RESEARCH

IN THIS ISSUE

ON THE COVER: R. Dennis Rouse, former AAES director, stands in front of the new Auburn University building that bears his name.

UPCOMING EVENTS

June 16	**Vegetable Field Day, Sand Mountain Substation, Crossville**
June 29	**Horticulture Field Day, E.V. Smith Research Center, Shorter**
June 22	**Vocational Agriculture Teacher-Student Crop Production, Sand Mountain Substation, Crossville**
July 13	**Fruit and Vegetable Field Day, Chilton Area Horticulture Substation, Clanton**
July 14	**Fruit and Vegetable Field Day, North Alabama Horticulture Substation, Cullman**
July 21	**Cotton Field Day, Tennessee Valley Substation, Belle Mina**
August 17	**Cotton Tour, E.V. Smith Research Center, Shorter**
August 25	**All Commodity Field Day, Wiregrass Substation, Headland**
September 1	**Wildlife Field Day, Piedmont Substation, Camp Hill**
September 20	**Cotton Field Day, Gulf Coast Substation, Fairhope**

DIRECTOR'S COMMENTS

This column is often devoted to the accomplishments of the Alabama Agricultural Experiment Station, but this time I'd like to devote it to an individual. This extraordinary individual, R. Dennis Rouse, has made a difference in Alabama agriculture and the lives of all Alabamians.

On April 29, the R. Dennis Rouse Life Sciences Building was dedicated on the Auburn University campus. It is a long-awaited, badly needed facility that allows us to more efficiently meet the research and teaching challenges facing us in the broad area of molecular biology.

Only a handful of Auburn faculty have their name on a building on campus, and virtually none have lived to see the dedication. His participation in the dedication of the Rouse Life Sciences Center truly qualifies Dr. Rouse to be among a select few Auburn living legends.

Dr. Rouse served as dean of the College of Agriculture and director of the Agricultural Experiment Station from 1972-1980. Among his many, many accomplishments was establishing the E.V. Smith Research Center in Shorter as a viable alternative to on-campus research.

Dr. Rouse also had a outstanding career as a teacher and researcher in agronomy and soils. He was instrumental in setting up Auburn's Soil Testing Lab.

On a more personal side, following in his footsteps as director, I have some unique insights into the difficulty of some of his accomplishment. His dedication and dogged persistence in doing things the right way have made the road I travel as director a little less difficult. Thank you!

Lowell T. Frobish
Director

Summer 1994 Volume 41 Number 2

A quarterly report of research published by the Alabama Agricultural Experiment Station, Auburn University.

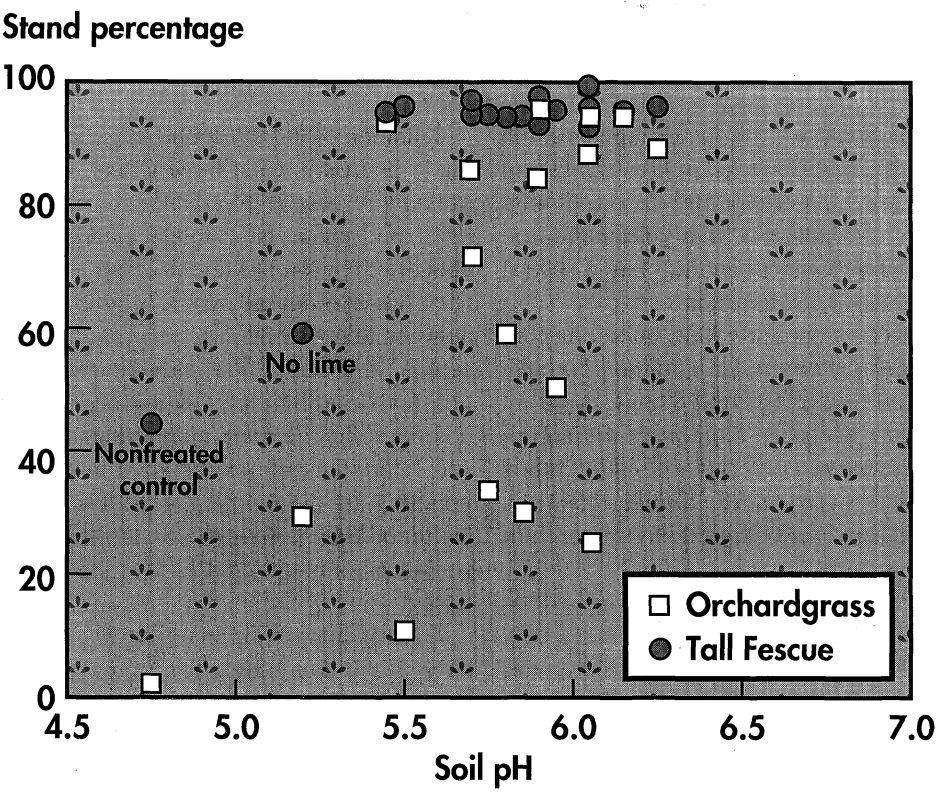
EDITOR'S NOTE. Mention of trade names does not indicate endorsement by the Alabama Agricultural Experiment Station or Auburn University of one brand over another. Any use of pesticide rates in excess of labeled amounts in research reported does not constitute recommendation of such rate. Such use is simply part of the scientific investigation necessary to evaluate various materials. No chemical should be used at rates above those permitted by the label. Information contained herein is available to all persons without regard to race, color, sex, or national origin.

E. van Santen, C.C. Mitchell, D.M. Ball, J.T. Eason, and R.C. Rawls

Endophyte Has Little Influence on Fescue Stand Establishment

Producers persistently report poor establishment of endophyte-free tall fescue. Because Alabama soils often are acidic and infertile, some producers and researchers expected that soil fertility might play a role in the reported endophyte-free fescue establishment problem. However, an AAES study has shown that both endophyte-infected and endophyte-free fescue are quite tolerant of adverse soil fertility conditions during establishment.

The study, conducted at the Sand Mountain and Upper Coastal Plain substations, investigated soil fertility factors influencing stand establishment of endophyte-infected and endophyte-free fescue. These included pH, phosphorus (P), potassium (K), and nitrogen (N). The study was conducted on long-term rotation and fertility study plots at the two substations. Treatments consisted of residual soil P, K, and magnesium (Mg) concentrations ranging from very low to high. Soil pH variables also were available in treatments that had never been limed. Nitrogen fertilization rates from zero to 200 pounds per acre in split applications also were included as treatments on fescue.



Effect of soil pH on stand percentage of orchardgrass and tall fescue at the two-year rotation site at the Sand Mountain Substation one year after seeding.

Plant material consisted of three pairs of endophyte-infected and endophyte-free experimental populations. To exclude all extraneous effects on the outcome of the trial, seed for the three pairs was produced at a common location. The seed was genetically identical, and seeding rates were adjusted for differences in germination. All entries were seeded into a well prepared seedbed in October 1992. Plots were harvested at 12-inch canopy height. Stand ratings were taken one year after establishment.

Most fertility treatments resulted in excellent stands (greater than 90%) for all entries at both locations. The average stand difference between endophyte-infected and endophyte-free entries was only 1%.

Tall fescue is an amazing forage species in its response to residual soil fertility, as was demonstrated by comparing it to an orchardgrass check which was included in one study site (see figure). Of all the long-term fertility treatments, only the no lime and the control plot, which had no fertilizer or lime applied to it for more than 60 years, had reduced stands of tall fescue. Stand percentages for all other treatments were above 90%. Again, there was little difference between Ky-31 endophyte-infected and Ky-31 endophyte-free. In contrast, nine of 17 fertility treatments resulted in less than 80% stand for orchardgrass.

Without a doubt, many producers have had more difficulty establishing stands of endophyte-free fescue than they are accustomed to having with endophyte-infected fescue. Endophyte-free fescue is less tolerant to some stresses than endophyte-infected fescue, but results from the first year of these studies suggest that soil fertility alone is not responsible for any differences in establishment success. However, this does not rule out the possibility that other stress factors, such as defoliation, insects, or diseases, may interact with fertility in certain situations.

van Santen and Mitchell are Associate Professors, and Ball is a Professor of Agronomy and Soils. Eason is Superintendent of the Sand Mountain Substation. Rawls is Superintendent of the Upper Coastal Plain Substation.

L.L. Hyche

The Catawba Worm: Bad for Catalpa Trees But Good for Fishing

The "catawba worm" feeds exclusively on the leaves of catalpa trees and often completely strips the plants of foliage, making the caterpillar an unwelcome pest to the landscape-minded homeowner. However, to live-bait fishing enthusiasts, a catalpa tree decorated with these caterpillars is highly desirable, and the term "catawba worm" has a special meaning: good fish bait.

Anglers regularly have questions concerning the caterpillar's development and habits. Results of an AAES research project provide this often-requested information. The catawba worm is one of many insects studied in a program to identify, catalogue, and record habits of common tree insects in Alabama.

The caterpillar is officially named the catalpa sphinx (*Ceratomia catalpae*). Catawba is the Cherokee name for the catalpa tree, which is possibly the origin of the name "catawba worm."

The catalpa sphinx overwinters as a pupa in the soil. The pupa (Figure 1) is bare, reddish brown, and 30-35 millimeters long (EDITOR'S NOTE: one inch is 25.40 mm). After catalpa trees develop leaves in the spring, pupae work their way to the soil surface and adults emerge. The adult (Figure 2) is a robust moth, 30-35 mm long, with gray spindle-shaped body and mottled gray-brown wings. Moths generally fly at dusk and at night and are not often seen. Adult females lay eggs in mounded masses (Figure 3) on the undersurface of leaves. The number of eggs per mass may range to 1,000, but most masses contain 300-800.

Eggs hatch in a week to 10 days. Newly hatched caterpillars (Figure 4) are whitish to pale yellow and have a black spine at the rear. As caterpillars grow, coloration changes; heads are black, and bodies are pale yellow to greenish-yellow with black markings. Full-grown caterpillars (Figure 5) are 70-75 mm long and variously marked with a solid black band or a row of black spots bordered by black lines down the back.

Duration of the caterpillar stage varies but is generally about three weeks. Full-grown larvae drop from leaves, enter the soil, and pupate. New moths emerge in about two weeks. The length of the whole life cycle is about six weeks. In Alabama, three or four broods may occur during a season, and caterpillars may be present until leaf drop in the fall. Generations often overlap, and different developmental stages and caterpillars of various sizes may be present at the same time. Larvae from the last brood in the fall burrow into the soil and pupate; adult moths emerge the following spring.

Caterpillars may be common for one to three years, then scarce for a few years. Parasites and predators often are responsible for controlling populations. One common parasite is a small wasp that deposits eggs into the caterpillar. Eggs hatch, and wasp larvae feed inside the worm. When parasite larvae are grown, they emerge and spin white silken cocoons on the outside of the caterpillar (Figure 6). Parasitized worms do not reach adulthood. Unfortunately, there is no effective method of eliminating the parasites without harming the caterpillars.

For more information, contact the Office of Research Information at (205) 844-4877 for a copy of AAES Leaflet 106, *The Catalpa Sphinx*.

Hyche is an Associate Professor of Entomology.

Figure 1. Pupa of the catalpa sphinx (top).
Figure 2. Catalpa sphinx adult.
Figure 3. Typical egg mass on the underside of catalpa leaf. This mass contained about 650 eggs.
Figure 4. Newly hatched larvae.
Figure 5. Full-grown "catawba worms." Note color variation.
Figure 6. Wasp parasite cocoons on the body of a dying caterpillar.

A.K. Hagan, K.L. Bowen, and J.R. Weeks

Multiple Applications of New Fungicide Needed to Control White Mold in Peanuts

White mold, the most destructive disease of Alabama's peanut crop, cuts annual yields statewide by nearly 20%, and severe outbreaks can reduce yields by 40% or more. Folicur 3.6F®controls *Sclerotium rolfsii*, the causal fungus of white mold. AAES studies determined the number of applications needed for effective disease control with this experimental fungicide.

Trials were conducted in 1992 and 1993 on peanuts in irrigated and nonirrigated fields with a history of white mold damage. Florunner peanuts were planted in late April. Full canopy sprays of Folicur and Moncut® were applied according to manufacturer guidelines at 15 gallons total volume per acre. Induce® spray adjuvant at two quarts per 100 gallons was added to Folicur sprays. Agridex® spray adjuvant was tank-mixed at one quart per 100 gallons with Moncut. White mold hit counts (one hit ≤ one foot of row with one or more diseased plants) were made after the peanuts were inverted.

In 1992, late summer weather was wetter and cooler than in the previous two years. All treatments of Folicur and Moncut greatly reduced the incidence of white mold (see table). A single application of Folicur proved less effective against white mold than four applications, while disease control with two and four Folicur applications was similar. Peanut yield was increased by all fungicide treatments. Yield gains with Folicur ranged from 549 pounds per acre to 1,227 pounds per acre, respectively, with one and four applications. Yield in Moncut-treated plots was 971 pounds per acre higher.

Hot, dry late summer weather in 1993 may have reduced the effectiveness of Folicur. A single application of Folicur failed to protect peanuts from white mold in 1993. Although the remaining fungicide treatments reduced disease damage, differences in disease control were seen. Four applications of Folicur reduced white mold incidence by 92%. Moncut and two applications of Folicur were slightly less effective than four applications of Folicur.

All treated plots had higher yields, but considerable differences in yield gains were noted among treatments. Yields increased 1,625 pounds per acre in the plots treated with four applications of Folicur. Yields increased 1,275 pounds with a single application of Moncut. Yield increases of 474 and 663 pounds, respectively, were seen with one and two applications of Folicur.

Under severe disease pressure, four applications of Folicur effectively controlled white mold and greatly increased peanut yield. Over two years, disease control (95%) and yield response (1,426 pounds per acre) were better with four applications of Folicur than with all other treatments.

Despite similar white mold control both years, yield gains with two applications of Folicur were far better in the cooler, wetter summer of 1992 than the hot, dry summer of 1993. Also, two applications of Folicur did not boost yields as consistently as four applications or one application of Moncut. Such erratic results indicate that the residual activity of Folicur may be reduced by unusually high temperatures.

Moncut (left) gave excellent disease control. Compare with injury on adjacent nontreated plot (right).

With a reduction in white mold damage of 80% and 1,126 pounds per acre yield gain over a two-year period, one application of Moncut was nearly as effective as four applications of Folicur. Consistent yield gains show that Moncut may not be affected by extreme heat.

Registrations for use of Folicur and Moncut on peanuts are pending before EPA. Release of either fungicide will give Alabama peanut growers an effective weapon against white mold and Rhizoctonia limb rot.

Hagan is a Professor and Bowen is an Associate Professor of Plant Pathology. Weeks is an Associate Professor of Entomology.

Application Number of Folicur and Control of White Mold on Peanut[1]

Treatment	Spray time	1992 Hits[2]	1992 Yield	1993 Hits	1993 Yield
	DAP[3]	*No.*	*Lb./a.*	*No.*	*Lb./a.*
Folicur 3.6F	90	5.7	4,020	13.8	3,200
Folicur 3.6F	75, 90	1.6	4,609	5.0	3,389
Folicur 3.6F	60, 75, 90, 100	0.3	4,698	1.3	4,351
Moncut 50W	75	2.8	4,442	3.8	3,898
Control	—	17.7	3,471	16.3	2,726

[1]Data are averages for three farms in 1992 and 1993.
[2]One hit = one foot of row with one or more diseased plants. Number in this table indicate hits per 100 feet of row.
[3]DAP = days after planting when fungicide was applied.

K.H. Yoo, J.H. Dane, and B.C. Missildine

Conservation Tillage Improves Soil Moisture

Interest in conservation tillage has been strong for the past decade because it reduces erosion and improves soil-water conservation, which can contribute to increased crop yield. This method, which entails leaving plant residue on a field after harvest, protects the soil, reduces evaporation, and slows runoff. Infiltration of water into the soil also is improved.

An AAES study at the Tennessee Valley Substation in Belle Mina measured the soil-water conservation potential of three tillage systems as part of a tillage and water quality study. The treatments, established on 12 quarter-acre plots of McNair 235 cotton, were conventional tillage (CT), reduced tillage with Coker 747 winter wheat as a cover crop (RTC), and reduced tillage with no cover crop (RT).

The reduced-tillage plots were planted with a John Deere Flex-71 no-till planter. All conventional-tillage plots were planted with a John Deere Maxemerge planter. The reduced-tillage with cover crop plots were tilled with a chisel plow and disked prior to planting winter wheat. For all tillage treatments, the crop residue was shredded and distributed evenly on the soil surface after harvest.

Soil-water contents were measured weekly from the center of each plot at depths ranging from 8-40 inches. The table shows the average of these readings under three field conditions: after planting, after a long dry period, and after heavy rainfall. RT with no cover crop had the highest water content, followed by RTC and CT.

During the first few weeks after planting, soil moisture at eight inches was about the same for all three tillage treatments (see figure). As the season progressed, however, the RTC treatment showed soil-water contents at this depth significantly higher than the other systems. Additional residue left from the cover crop, which increased infiltration and decreased evaporation, accounts for the higher soil-water contents of the RTC treatment.

At 16 inches and below, soil-water contents for both reduced tillage treatments were higher than for conventional tillage. At 16 and 40 inches, the RT and RTC treatments showed similar soil-water readings. At 24 and 32 inches, RT with no cover crop showed soil moisture conservation superior to other treatments.

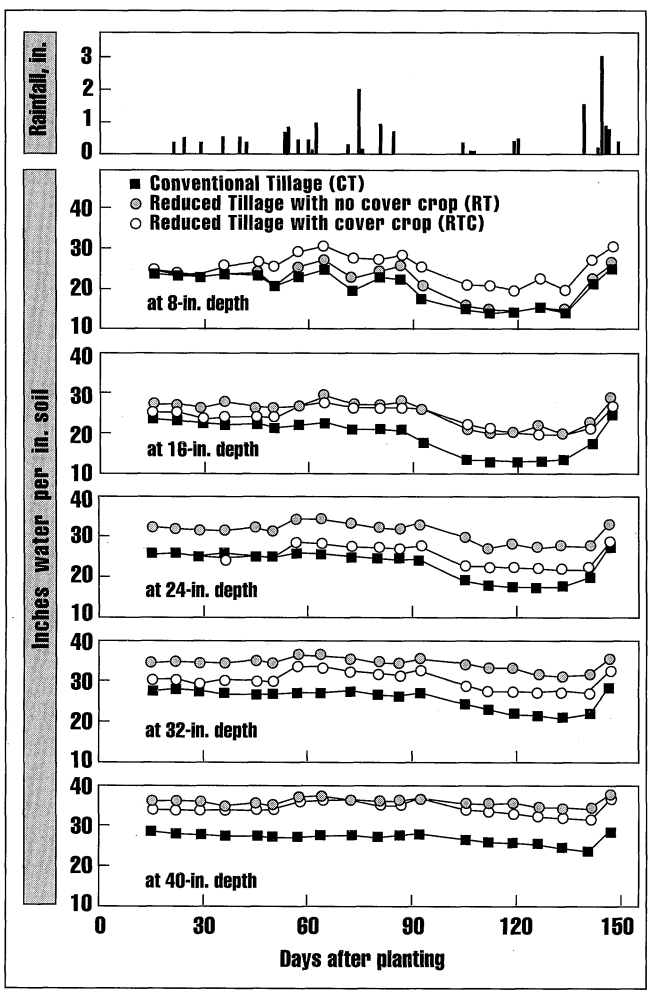
After a prolonged drought in July and August, the soil was extremely dry for all treatments, especially at shallower depths. All treatments showed quick responses to the high-intensity rainfall in September, with measured soil-water contents increasing to equal or exceed those of the early growing season at all depths.

In summary, the study confirms the soil-water conservation effect of the two reduced tillage technologies. Reduced tillage with a winter cover crop shows some advantage at shallow depths over reduced tillage without a cover crop. However, higher soil-water contents at intermediate depths are provided by reduced tillage without a cover crop. Overall, except at shallow depths early in the growing season, conservation tillage techniques consistently provide improved soil moisture over conventional tillage.

Average Soil-Water Contents in 40-Inch Soil Depth[1]

Date	Rainfall since last measurement	Tillage[2]		
		CT	RT	RTC
	In.			
5/5 (15)[3]	31.1	0.258	0.310	0.281
8/31 (133)	0.0	0.180	0.252	0.240
9/14 (147)	133.3	0.266	0.319	0.303

[1]Soil-water contents are measured in cubic inches of water per cubic inch of soil.
[2]CT = conventional tillage; RT = reduced tillage with no cover crop; and RTC = reduced tillage with cover crop.
[3]Numbers in parentheses are days after planting.



Daily rainfall and soil-water contents at five soil depths.

Yoo is an Associate Professor of Agricultural Engineering. Dane is a Professor and Missildine is a Research Associate in Agronomy and Soils.

W.J. Moar, T.P. Mack, and P.A. Backman

Using Bacteria to Control Peanut and Tomato Pests

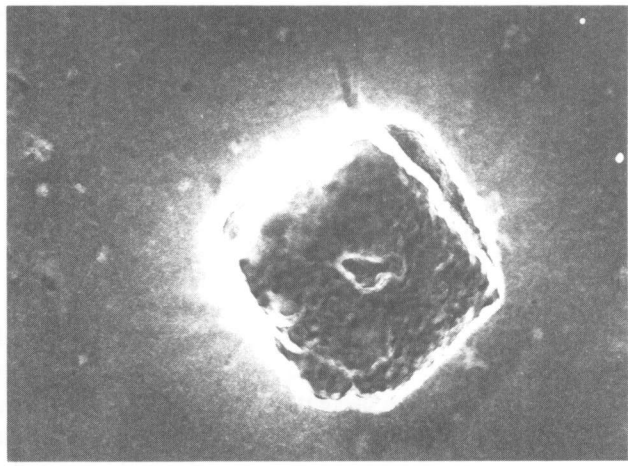


Figure 2. An electron microscope image of the CryIIA protein, which is toxic to major peanut and tomato pests.

Increasing concerns about the safety of chemical pesticides has made development of effective, cost-efficient alternatives a priority. Many such efforts rely on beneficial bacteria or other organisms to control insects and pathogens.

AAES research has found a bacterially produced protein highly toxic to a major peanut pest — the lesser cornstalk borer (LCB) — as well as several caterpillars that feed on tomato leaves and fruit. Studies are underway to genetically engineer peanut plants that express the gene responsible for producing the insecticidal protein. Researchers also are working to engineer the gene into beneficial bacteria that are known to live on peanut and tomato plants.

Peanut Pests. LCBs cost Alabama peanut farmers $2.1 million in 1992, including expenses incurred in controlling the pest and losses caused by borer damage. The borer also can transmit the fungus, *Aspergillus flavus*, which produces carcinogenic aflatoxins. Granular insecticides typically are used to manage borers. These pesticides often are applied once a season, but they are not effective season-long under the hot, dry conditions conducive to LCB outbreaks.

Bacillus thuringiensis (BT) is a member of a common bacterial family which lives primarily in the soil. What makes BT unique is its ability to produce proteins that kill certain insects. Bacterial insecticides based on BT are effective at controlling many caterpillars, but these BT proteins have not been tested against LCBs. BTs are harmless to humans and have no pre-harvest interval label requirements.

AAES research was done to determine if LCBs are killed by HD-1, a BT strain found in many commercial products. Because BT proteins are not heat stable, they will break down in the field over a short time. To promote season-long persistence of the BT protein, researchers began efforts to engineer peanut plants and peanut-associated bacteria to express the protein-related gene. Studies also were initiated to determine which BT protein was the most effective.

HD-1 and other BT proteins were tested against newly hatched LCB larvae. The HD-1 strain was toxic at a diet concentration of about five parts per million (ppm) (Figure 1). This is comparable to the level of toxicity HD-1 exhibits against the cabbage looper, which is successfully controlled in vegetable fields with BTs. Of the five BT proteins tested, CryIIA was the most toxic at a concentration of 1.34 ppm. It was selected as the source of genes for the peanut genetic engineering program (Figure 2).

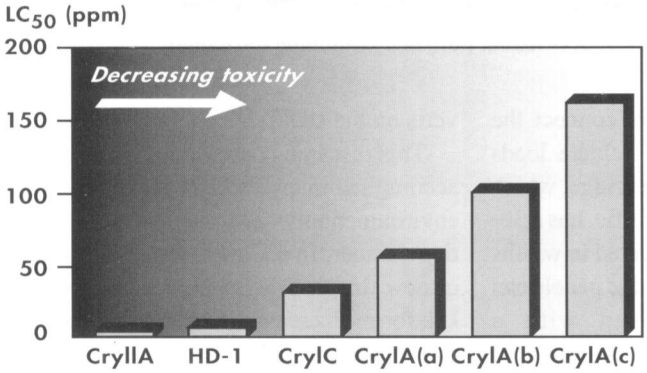


Figure 1. Toxicity of five purified proteins and the HD-1 strain of BT against the lesser cornstalk borer. LC_{50} = lethal concentration to kill 50% of the population. The lower the value, the more potent the pesticide.

Tomato Pests. As with peanuts, one of the best ways to ensure adequate stability and quantity of BT proteins on the leaf surfaces of tomato plants is to have the protein produced in bacteria that naturally live on leaves.

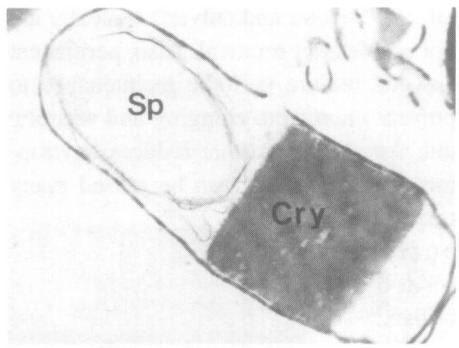


Figure 3. Expression of CryIIA protein in the BT-8 strain of bacteria. This bacterium is now insecticidal and fungicidal. Sp = spore; Cry = CryIIA crystal protein.

BT-8 is a strain of *Bacillus cereus* that was isolated from tomato leaves and is effective against several important tomato fungal pathogens, including *Alternaria solani*, which causes early blight disease. The CryIIA gene was inserted into BT-8, making it insecticidal against cabbage loopers and tobacco budworms in laboratory tests (Figure 3).

Although the BT-8/CryIIA hybrid does not kill armyworms, another major pest of tomatoes, research is currently being done to insert a different BT gene into BT-8, which may make it toxic to armyworms. Subsequent tests will be done to determine the efficacy and stability of the genetically engineered bacteria under field conditions.

Moar is an Assistant Professor and Mack is a Professor of Entomology. Backman is a Professor of Plant Pathology.

S.E. Taylor

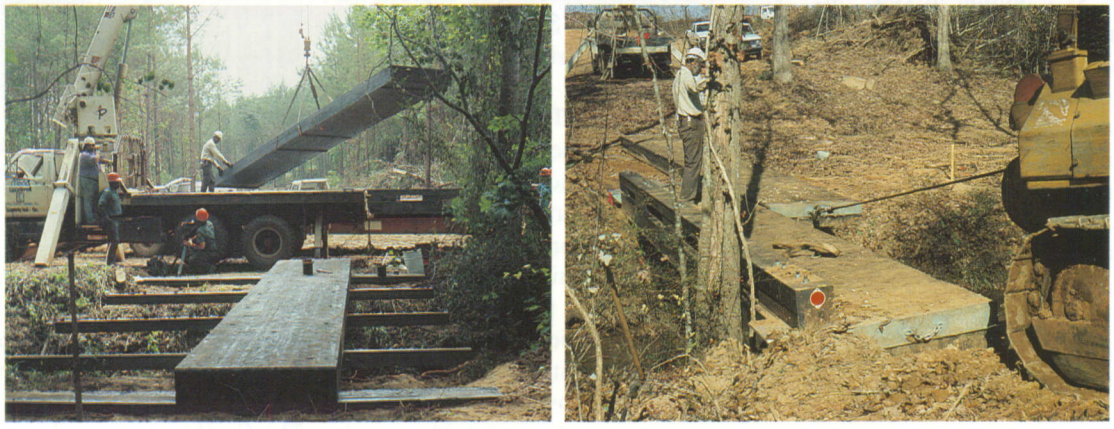
Portable Timber Bridges Offer New Options for Stream Crossings

Many forestry activities require short-term access across forest streams. Since current best management practices discourage traffic through a stream, culverts often are used for stream crossings. However, installation and removal of a culvert can introduce sediment into the stream, and culverts typically are not usable after removal. Also, permanent culverts require periodic maintenance to prevent them from clogging and washing out. An alternative that reduces environmental impacts and can be reused many times is a portable timber bridge.

Modern timber bridge systems have many advantages that make them ideal for use as portable bridges. Timber bridges use locally-available wood products, they can last many years when treated properly, they are relatively lightweight and easy to fabricate, and they can be prefabricated to reduce installation time at the stream site.

In a joint AAES/USDA Forest Service project, researchers are developing portable timber bridge systems for use on forest roads and skid trails. These portable bridges also can be used on highways where a bridge has been washed out by flooding or where a deficient bridge is being replaced. The goal of the research is to develop safe and affordable portable bridge designs that will reduce water quality impacts and construction costs at stream crossings.

One portable timber bridge uses glued-laminated (glulam) timbers in a relatively new design. The bridge consists of three or four flat glulam deck panels that are laid side by side on the stream banks. These deck panels are the main load-carrying members. Glulam stiffener beams, which are bolted under the bridge, connect the deck panels and distribute vehicle loads more evenly over them. The bridge, which was designed for log truck traffic, has a 30-foot span and can be constructed in widths of 12 feet or 16 feet. The bridge panels can be installed and removed with a knuckleboom loader or truck-mounted crane, or they can be winched into place with a skidder or crawler tractor. Installation requires about six hours (not including road construction time), while removal can be accomplished in about three hours.



Bridge panels can be installed and removed by a crane or knuckleboom loader (left) or by winching the panels across the stream (right).

The components for the bridge were fabricated by an Alabama glulam timber manufacturer, and the bridge has been tested in logging operations on tracts near Auburn. The bridge has performed well during these tests. It is stiffer than design calculations predicted, and it has experienced no substantial damage during one year of use.

Tests are underway to document the water quality impacts from this type of stream crossing, and preliminary findings indicate that it can reduce the amount of sediment introduced into the stream compared to the use of culverts. However, in addition to the type of stream crossing, proper road construction practices around the stream crossing also are essential for preserving water quality.

The initial cost of this bridge was greater than the cost of a typical culvert. Materials costs were $15,500, and installation and removal costs ranged from $500 to $1,000 per site, depending on the equipment used. However, if the bridge is used at 10 different stream crossings, the cost per installation is approximately $2,550, which is equal to or less than the cost of installing culverts on the same size streams.

This research is providing new ways to accomplish many forestry activities in an environmentally-sensitive and cost-effective manner. In addition, the development of new timber bridges provides new markets for and increases the value of Alabama's forest products.

Taylor is an Assistant Professor of Agricultural Engineering.

D.B. South and J.I. Blake

Top-pruning Increases Survival of Pine Seedlings

Top-pruning loblolly pine seedlings with a rotary mower.

Some landowners prefer natural-looking loblolly pine seedlings and ask nursery managers to grow the trees without top-pruning, but these customers may regret that request. AAES research has shown that multiple top-pruning is a consistently effective way to improve the survival of pine seedlings after transplanting.

This method of controlling seedling height in the nursery bed produces short, well-balanced seedlings that are better prepared to cope with stressful growing conditions. Previous studies showed that a three-stage, top-pruning system is more effective than a single pruning. The single-pruning method actually produced seedlings that grew in the nursery to be slightly taller than the nonpruned seedlings.

AAES top-pruning studies were established at nurseries in Florida, Mississippi, and South Carolina. Seedlings were first top-pruned in mid-July to a height of four inches. This treatment cut only a small percentage of the seedlings. The second clipping was in early-August; the third, late-August. August prunings were at a height of six inches (see figure).

Seedlings were lifted from seedbeds in late November in Florida and Mississippi and mid-December in South Carolina and were stored for up to six weeks before outplanting on cutover sites. Seedlings were planted at one of two depths: normal planting depth (root collar placed 0.5 to 4.7 inches below the surface) and deep planting depth (3.7 to 6.5 inches below the surface).

The top-prunings were effective in reducing seedling height by one to two inches (see table). Reducing shoot mass resulted in seedlings with a slightly better balance between roots and shoots. For the normal planting depth, top-pruning improved survival by 12% to 24%. Deeper planting increased survival of nonpruned seedlings, but had little effect on top-pruned seedlings.

When soil moisture is high and environmental conditions for survival are favorable, there will be little or no improvement in survival by planting top-pruned seedlings. However, when seedlings are exposed to stress, top-pruned seedlings typically exhibit improved survival. In addition, a recent Auburn University study indicates that top-pruned loblolly pine seedlings are less susceptible to freeze injury.

There are several alternative methods of height control, but these all have drawbacks. Undercutting roots will improve root fibrosity, but it affects all seedlings, while top-pruning can be selective. Reducing irrigation is not effective when rainfall is plentiful. Undercutting used in combination with reduced irrigation can reduce both height and diameter growth. Reduced fertilization results in smaller-diameter seedlings, as well as slower growth after outplanting. In general, nurseries that do not top-prune tend to use methods that produce small diameter seedlings with small root systems. Although small seedlings are easier to plant, properly planted large-diameter seedlings with plenty of roots have a better rate of survival and growth.

Despite the advantages of top-pruning, some planters still prefer a more "natural" seedling with a single terminal bud. Some still believe the myth that long-term seedling performance is directly related to the presence of a terminal bud. In addition, some believe that a top-pruned seedling will grow to produce a forked tree. However, one cannot discern the difference between pruned and nonpruned trees at three years of age.

Informed customers will not be overly concerned with the appearance of the shoot tip. They will seek a well-balanced seedling with a large root-collar diameter (one-quarter inch) and a fibrous root system.

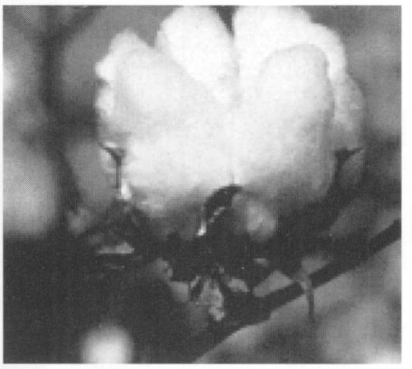
South is a Professor and Blake is a former Assistant Professor of Forestry.

Effects of Multiple Top-Pruning and Planting Depth on Survival of Loblolly Pine from Three Nurseries

Nursery	Nursery height		Normal planting depth		Deep planting	
	Top-prune	Nonpruned	Top-prune	Nonpruned	Top-prune	Nonpruned
	In.	*In.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Florida	10	12	82	70	85	82
Mississippi	8	9	72	60	74	69
South Carolina	10	12	88	64	85	74

H.W. Kinnucan, H. Solomon, and P.A. Duffy

How Effective Is Export Promotion of U.S. Cotton?



The U.S. cotton industry, with financial assistance from the federal government, has been conducting promotion programs in overseas markets for more than 40 years. The purpose of these programs is to encourage foreign countries to use more U.S.-produced cotton in their spinning and weaving industries and to encourage foreign consumers to buy products produced with U.S. cotton.

In recent years, financial investments in overseas promotional programs have increased dramatically, thanks to new federal legislation that expands the amount of money available to agricultural groups for export promotion. In 1992, for example, the cotton industry spent more than $50 million on export promotional activities, compared to $7 million in 1986.

Effects of a $10 million Increase in Spending on Export Promotion of U.S. Cotton on Prices, Quantities, and Government Costs

Variable	Level of variable when promotion is:		Pct. change
	$50 million	$60 million	
Target price (cents)	72.9	72.9	0.00
Domestic price (cents)	58.0	59.1	1.87
Domestic mill use (mil. lb.)	3,036	3,002	-0.56
Exports (mil. lb.)	3,036	3,070	0.56
Industry revenue (bil. dol.)	4.426	4.426	0.0
Government costs (mil. dol.)	904.7	838.7	-7.29

Recent AAES research examines the effectiveness of the U.S. cotton industry's export promotional activities. The analysis proceeded in two stages. First, a statistical analysis was conducted to isolate the effect of promotional expenditures on U.S. cotton exports. Then, based on these findings, a computer simulation model was built to indicate the effects of increased promotional spending on the domestic cotton price, domestic mill use, quantity of cotton exported, and government outlays for the cotton price support program.

The first phase involved developing a model that indicates how the U.S. share of cotton in selected markets is influenced by such variables as the U.S. price relative to competitors' prices, currency exchange rates, previous levels of market share, and U.S. promotional expenditures. The model was estimated for Japan, Korea, Taiwan, Hong Kong, Philippines, and Thailand using 20 years of data. Historically, about 60% of U.S. cotton exports have gone to these Pacific Rim countries, and that region has been the primary target of cotton promotional efforts in recent years.

Results indicated a significant relationship between promotional expenditures and U.S. market share in four of the six countries. Of the two countries exhibiting a nonsignificant effect (Taiwan and Thailand), one had very low promotional expenditures. This suggests that a minimal level of spending may be necessary to achieve a market response. Japan, which accounted for about 60% of total spending over the sample period, showed the greatest responsiveness to increased promotion expenditures.

In the next phase, researchers programmed a computer simulation model that specifies the supply and demand relationships for U.S. cotton, taking into account government price support programs and how they affect domestic production. In addition to containing relationships describing export demand, the model contains equations to indicate how government program costs are affected by changes in the level of cotton exports.

In the simulations, it was assumed that current Farm Bill provisions for cotton are in effect: a target price of 72.9 cents per pound, and all acreage is eligible for deficiency payments. The baseline market price was assumed to be 58 cents per pound, and baseline U.S. production was set at 12.6 million bales, or more than 6 billion pounds. A $10 million (20%) increase in promotional expenditures was simulated.

Results show that this $10 million increase has only a modest effect on cotton exports (see table), but foreign demand is enhanced enough to increase the price of cotton by 1.1 cents per pound. The price increase reduces the domestic demand for cotton, slightly reducing domestic mill use. The increased export demand is exactly offset by the decrease in domestic demand, leaving the total quantity demanded unchanged. Thus, industry revenue is not increased.

Based on this research, the major beneficiary is the American taxpayer. According to the model, a $10 million increase in foreign promotions reduces the cost of the cotton deficiency payment program by 7.29%. This represents a net savings to the federal treasury of $66 million, or about $6.60 for each additional dollar spent on promotion.

These favorable public returns justify the increased federal spending on export promotion. However, further research is needed to determine whether export promotion in general is cost effective. For example, no research exists on the economic impact of the domestic cotton promotional program. Still, the estimated $6.60 benefit per cost ratio for cotton suggests export promotion may be a cost-effective policy instrument for increasing the competitiveness of U.S. agricultural commodities in overseas markets.

Kinnucan is an Associate Professor of Agricultural Economics, Solomon is an Assistant Professor in the Tuskegee University School of Business, and Duffy is an Associate Professor of Agricultural Economics.

A.G. Appel, E.P. Benson, and J.M. Ellenberger

Avermectin-based Baits Control Cockroaches

Controlling cockroaches is a constant challenge in the Southeast, but a class of pesticides used on livestock is providing a new control option. AAES research shows that the effectiveness of these pesticides, known as Avermectins, may depend on the way they are formulated and applied.

Avermectins are effective against many insects and other invertebrates but pose no human health threat at recommended rates. Avermectins have been available since 1981 for use against cattle parasites and have recently been approved for cockroach control in dwellings, commercial kitchens, and hospitals.

Cockroaches must consume Avermectin for the insecticide to take effect. Avermectins are relatively slow-acting and nonrepellent, and there is no apparent cross-resistance between them and any of the conventional insecticides. These are ideal qualities for an insecticidal bait.

AAES researchers have evaluated several professional-use and consumer Avermectin bait formulations in laboratory and field experiments with German cockroaches, *Blattella germanica* (L.).

In laboratory tests, groups of cockroaches were confined in one-quart jars with a piece of dry dog food, water, and a sample of bait. Several forms of Avermectin were used: powders, gels, aerosol sprays, and a dry formulation used in bait stations.

The dry, bait-station formulation was the most toxic, followed by the powder (see table). Moist aerosol and gel formulations, however, appeared to be the least toxic.

Moist formulations dry out rapidly after application and form hard, smooth deposits. Because texture affects food preference in cockroaches, researchers took dried deposits of the aerosol and gel baits and ground them to a fine powder — the same consistency as the powdered formulation. Toxicity of the ground baits was determined as before, and ground baits were 90% more toxic than nonground baits. These results suggest that hard deposits of the dried-out gels and sprays may be more difficult for cockroaches to feed on.

Toxicity of Avermectin Baits to German Cockroaches in Continuous Exposure Tests

Treatment	No. tested	Days until 50% were killed
Aerosol	60	36.5
Gel	60	41.2
Powder	60	2.8
Bait station	60	1.4
Control	80	123.6

Field performance of Avermectin baits was evaluated in cockroach-infested apartments. Apartments were treated with label rates of aerosol, gel, or powder formulations or with 12 bait stations. The average percent reduction of German cockroaches trapped in each group of apartments is shown in the figure.

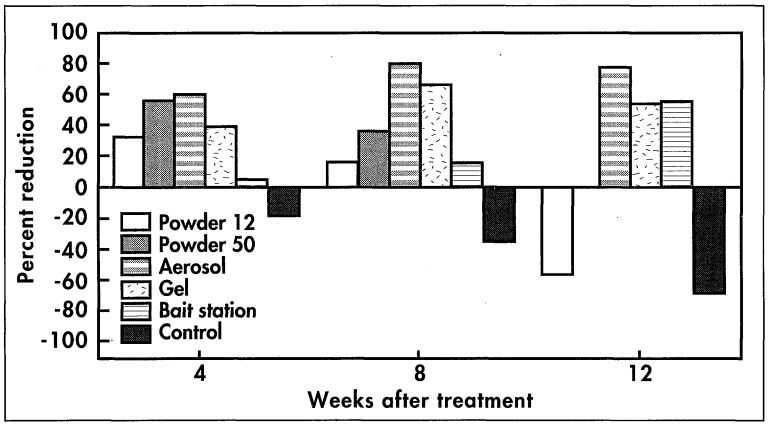
Aerosols and gels were applied and smeared into thin deposits. Applied in this way, spray-applied Avermectin was the most effective of the treatments in field tests. Applying the moist baits in thin deposits that cracked as they dried apparently made them more effective than they were in the laboratory tests. Cracks in the deposits allow cockroaches to grip the bait with their mouthparts while they eat.

The same overall amount of powder was applied to each of two groups of apartments. But the powder was applied at 12 sites in each apartment of one group, and it was applied at 50 locations in the other group. Powder applied at 50 locations worked faster and performed better than when applied at 12 locations. However, powder was completely consumed within the first four weeks, which accounts for the relatively poor performance of these treatments thereafter.

Despite their performance in the laboratory, bait stations performed poorly in the field, not reaching their maximum effect until 12 weeks. All of the bait had been consumed from the bait stations by 12 weeks.

Cockroach numbers increased in nontreated control apartments throughout the trials. Population increases are shown as negative percent reductions in the figure.

Based on these findings, professional-use Avermectin bait formulations can be effective in controlling German cockroaches, but effectiveness will vary among formulations, and care must be taken to properly apply and renew the bait in many locations.

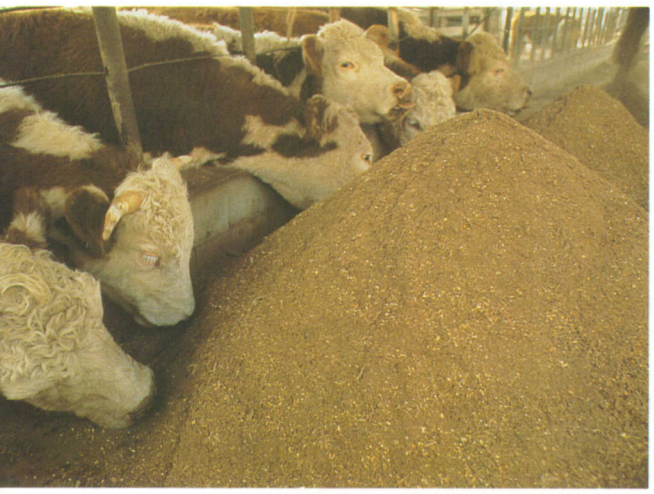


Percent reduction of cockroaches four, eight, and 12 weeks after treatment. A negative percent reduction means that insect populations increased.

Appel is an Associate Professor of Entomology; Benson is a former Associate Professor of Entomology and now an employee of DowElanco; and Ellenberger is a Research Technician in Entomology.

T.A. McCaskey, S.N. Britt, B.G. Ruffin, J.T. Eason, and R.C. Strickland

Feed Value of Broiler Litter for Stocker Cattle



Each year, Alabama's poultry industry produces about two million tons of broiler litter — the bedding, feed, feathers, and waste materials that collect on the floors of chicken houses. Improper disposal of this byproduct poses a threat to the environment, but with proper handling, litter can be a valuable resource.

Broiler litter has value as a fertilizer because it is a good source of nitrogen, potassium, and phosphorus, but an AAES project showed it is even more valuable when used as a feed for cattle. Auburn scientists, in cooperation with the Tennessee Valley Authority, found that beef producers can use litter in stocker cattle diets, dramatically cutting feed costs while maintaining acceptable weight gain and feed utilization.

Litter is a good source of crude protein, energy, and minerals, especially for overwintering brood cows and stocker calves. Because cattle have a specialized digestive system, they are able to digest such byproduct feeds that other animals cannot. However, not all broiler litter is suitable for use as feed. Only litter that contains less than 28% ash and more than 18% crude protein — with less than 25% of that protein in the insoluble or bound form — should be used as a feed ingredient.

To determine the feed value of broiler litter, stocker cattle were fed either a conventional diet containing corn, soybean meal, and cottonseed hulls, or a 50:50 mixture of corn and broiler litter (Table 1). The diets were formulated to provide approximately the same amounts of nutrients. Bovatec is routinely added to corn:litter diets to prevent bloat, and it was included in the conventional diet as well. The poultry litter was deep-stacked in a pole barn, covered with polyethylene sheeting, and stored 28 days before use. Diets provided 17% crude protein on a dry matter basis and 70% total digestible nutrients.

Thirty-six crossbred heifers, initially weighing 548 pounds, were purchased, vaccinated, dewormed, and implanted. Three groups were fed the conventional diet and three were fed the corn:litter diet. Cattle were housed in pens in an open-sided barn with a concrete floor, and manure was mechanically scraped from the barn twice daily. Water was available at all times during the 112-day trial, but the cattle were not fed any hay.

Consumption of the conventional and corn:litter diets was similar: 22.1 and 22.9 pounds per day, respectively (Table 2). Heifers consumed feed at 2.5-2.8% of body weight. Average daily gain was higher for heifers fed the conventional diet: 2.53 pounds per day, compared to 2.12. Thus, the feed:gain ratio for the conventional diet was 8.7:1 versus 10.8:1 for the experimental diet.

Researchers estimated feed costs at 7.6 cents per pound for the conventional diet and 4.2 cents per pound for the corn:litter diet. The cost for each pound gained by the cattle was higher for the conventional diet, 66 cents per pound, than for the corn:litter diet, 46 cents per pound.

These figures indicate that a beef producer could pay up to 6.1 cents a pound, or $123 per ton, for the corn:litter diet, and production costs would be similar to those incurred in feeding the conventional diet. But as the cost of the corn:litter diet increases above the $123 per ton, the economic advantage of feeding litter disappears, because it becomes more expensive than the conventional diet.

The economic advantage of feeding broiler litter becomes apparent when livestock producers are able to buy it at low cost and blend their own 50:50 diets. The difference between the break-even cost of $123 per ton and the cost required to prepare the corn:litter diet in-house represents the profit of feeding litter. However, producers must make sure they buy litter from a reliable source to ensure consistent nutritional quality of the poultry byproduct.

A major problem that prevents commercialization of pelleted litter feeds and similar products is the excessive market price demanded for such feeds. Most are in excess of the $123 per ton break-even cost.

Table 1. Composition of Diets

Ingredient	Conventional	Corn:Litter
	Lb./ton	*Lb./ton*
Cottonseed hulls	501.0	—
Soybean meal, 44%	160.0	—
Corn grain	1,218.0	1,000.0
Broiler litter	—	999.0
Urea	40.0	—
Minerals	80.0	—
Vitamin A-30	0.5	0.5
Bovatec	0.5	0.5

Table 2. Production Data for the 112-Day Study

Variable	Conventional	Corn:Litter
Initial weight (lb.)	550	546
Day 112 weight (lb.)	833	784
Gain (lb.)	283	238
Avg. daily gain (lb.)	2.53	2.12
Intake (lb.)	22.1	22.9
Feed:Gain	8.7:1	10.8:1
Feed cost/ton (dol.)	152	84
Feed cost/lb. (cents)	7.6	4.2
Cost/lb. gain (cents)	66	46

McCaskey is a Professor, Britt is a Research Associate, and Ruffin is a Professor of Animal and Dairy Sciences. Eason is Superintendent of the Sand Mountain Substation and Strickland is Project Manager of the TVA Biotechnical Research Department.

B.M. Hall, C.W. Wood, K.H. Yoo, K.S. Yoon, and D.P. Delaney

Nutrient Losses in Runoff from Land-Applied Broiler Litter

Much of the two million tons of poultry litter produced annually in Alabama is applied to crop and pasture land as a fertilizer. While litter is a good source of nutrients for some crops, it can pollute surface water. An AAES study indicates this problem can be controlled if careful attention is paid to application rates.

Poultry litter contains nitrogen (N), phosphorus (P), and other elements that can enhance crop growth. If these nutrients run off of agricultural land into surface waters, they can intensify the growth of aquatic weeds, causing eutrophication. Eutrophication occurs when excessive weed growth depletes oxygen in the water, possibly causing fish kills. The AAES study was initiated to determine optimal agronomic rates of litter with respect to water quality.

Research was conducted at the Tennessee Valley Substation in Belle Mina during 1991-1993 to study nutrient losses in runoff water from corn/rye cropping systems. Treatments of four tons of broiler litter per acre (BL4), eight tons of broiler litter per acre (BL8), or commercial fertilizer (F) at the recommended soil test rate were applied each spring to plots on a 4% slope. Commercial fertilizer applications included 400 pounds per acre of ammonium nitrate and 100 pounds per acre of triple superphosphate. Runoff samples were collected with flumes after each runoff-producing rainfall, and runoff volume was monitored (Figure 1). Samples were analyzed for organic N, nitrate, ammonium, dissolved P, and sediment P.

The BL8 rate resulted in more N, P, and nitrates running off the soil (Figure 2). Phosphorus losses also were influenced by litter applications. Both dissolved and sediment P losses were greater under BL8, as compared to fertilizer. Dissolved P is immediately available to aquatic plants.

The concentration of nutrients in surface water also is an important factor influencing eutrophication. Concentrations of inorganic N in runoff exceeding 5.3 parts per million (ppm) can support growth and reproduction of algae. This concentration was exceeded by all treatments in edge-of-field runoff losses, and was as high as 68 ppm under the BL8 treatment.

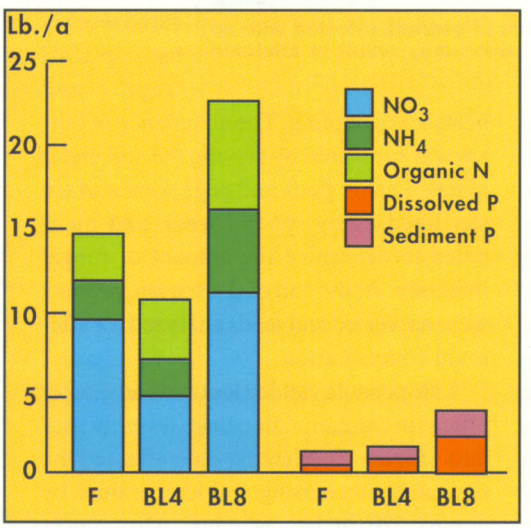


Figure 1 (top). Collection of runoff samples.
Figure 2. N and P losses in runoff from corn/rye cropping system.

Phosphorus is typically present in such small amounts in lakes that concentrations between 0.002 and 0.09 ppm are considered within a critical range necessary for algal growth. All treatments exceeded this range throughout the study, indicating that all treatments have *potential* for degradation of surface waters via losses of P. However, impacts of runoff losses of P are usually observed in receiving waters, such as rivers and lakes, rather than at the edge of contributing fields. Further research will be required to determine the impact of edge-of-field N and P losses on downstream water quality degradation.

These findings indicate that applications of broiler litter may result in significant contributions of N and P to surface waters. Because P is considered the critical factor in eutrophication, controlling losses of P from agricultural lands to surface waters is of utmost importance. Research suggests that litter should be analyzed prior to application so rates provide only the proper amounts of N and P needed for crop production. Because losses of N and P from BL4 were no greater than fertilizer in this study, and corn yields did not differ among treatments, four tons broiler litter per acre may be an optimal rate for litter application to corn.

Hall is a Research Associate and Wood is an Alumni Associate Professor of Agronomy and Soils. Yoo is an Associate Professor and Yoon is a Graduate Research Assistant in Agricultural Engineering. Delaney is an Alabama Cooperative Extension Service Resource Conservation Associate.

S.D. Stewart, T.P. Mack, K.L. Bowen, J.W. Kloepper, and J.H. Edwards

Early Planting May Help Prevent Outbreaks of Peanut Pests

Lesser cornstalk borers (LCB) and aflatoxigenic fungi are important peanut pests in the Southeast. Feeding damage from LCBs increases the chances of fungal infection, but it can be minimized with insecticides. However, there is increasing pressure to reduce pesticide use. Consequently, AAES researchers are looking at pesticide-free ways to manage borers and fungi.

Aflatoxigenic fungi often contaminate peanut kernels with highly carcinogenic substances called aflatoxins, which can cause liver cancer when eaten in sufficient amounts. World health officials recently decreased tolerances for aflatoxin contamination in peanuts to five parts per billion.

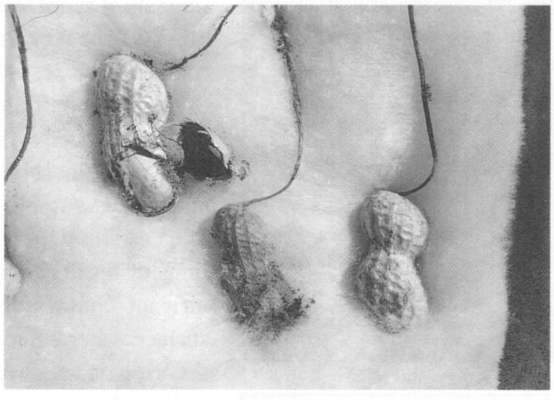


Figure 1. Pegs and pods of peanuts infected with an aflatoxigenic fungus, which may result in aflatoxin contamination.

Outbreaks of LCBs and aflatoxigenic fungi typically occur during hot, dry weather because they are adapted to these conditions, while most of their natural enemies are not. AAES research, funded in part by the USDA, is trying to alter the climate in peanut fields to reduce the potential for outbreaks of borers and aflatoxigenic fungi.

Growers can manipulate soil temperature and moisture by changing the planting date and spacing between rows of plants. The premise of the study was that the canopy of narrow-row peanuts would close more quickly and shade the soil, producing a cooler, more humid environment. Such conditions would reduce the potential for outbreaks by these pests and encourage better control by their natural enemies. However, AAES research suggests that time of planting provides greater control than narrow row spacing.

A study was conducted in 1993, when hot, dry conditions caused an outbreak of borers and aflatoxigenic fungi. Three different row spacings and two planting dates were used to alter the climate in field-plot studies at the Wiregrass Substation in Headland. Row spacings were: single rows spaced by 54 inches (wide), single rows spaced at 36 inches (normal), and twin seven-inch rows spaced alternately at 22 inches and 36 inches (twin). Peanuts were planted on May 11 (early) and May 31 (late). Predator abundance was measured weekly by pitfall traps and beatsheet sampling. The abundance of borers was measured by sieving the soil under plants. Peanut pods and pegs were surface sterilized every second week and incubated to determine the amount of fungal infection. At the end of the season, peanuts were harvested and seeds analyzed for aflatoxin concentration.

Late peanuts yielded less and had greater aflatoxin contamination than did early peanuts (Figure 2). Planting date affected the climate by increasing soil temperature by almost 2°F in late peanuts. Also, fewer predators were found in late peanuts, which contributed to the greater infestations of LCBs and aflatoxigenic fungi.

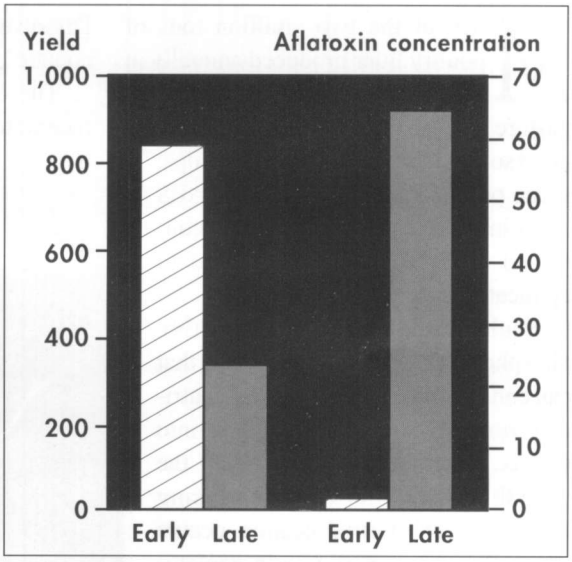


Figure 2. Yield (pounds per acre) and aflatoxin (parts per billion) concentration in early- and late-planted peanuts.

Plants were larger and produced more nuts per plant in wider row spacings because there was less competition for light, water, and soil nutrients. Contrary to the premise, soil temperatures under the canopy of twin-row peanuts were actually hotter than normal- or wide-row peanuts; further research is needed to discover why. Leaf-feeding caterpillars, such as the velvetbean caterpillar, were less abundant in twin-row peanuts, as were natural enemies. However, row-spacing had no affect on yield per acre, LCB abundance, fungal infection, or aflatoxin contamination.

These results suggest that planting early will help avoid outbreaks of LCBs and aflatoxigenic fungi. Early planting also helps farmers avoid drought-related yield reductions. Future work will help determine the best ways to alter the climate in peanut fields to prevent outbreaks of lesser cornstalk borers and aflatoxigenic fungi.

Stewart is a Postdoctoral Fellow and Mack is a Professor of Entomology. Bowen is an Associate Professor and Kloepper is a Professor and Head of Plant Pathology. Edwards is an Affiliate Professor of Agronomy and Soils.

R.H. Jones, A.H. Chappelka, and D.H. West

Tree Shelters: an Effective, Low-Cost Way to Establish Street Trees

Recent AAES studies showed that plastic shelters for seedlings are a cost-effective method for protecting new street tree plantings. This is good news for cities where tree planting goals are rarely met due to high establishment costs.

Forestry researchers install a plastic tree shelter.

The use of small, inexpensive trees has been avoided because small trees have a poor survival rate and often suffer too much damage from vandals and lawnmowers. Plastic shelters may make it possible to protect smaller trees and bring them through to successful establishment.

Most shelters are stake-supported tubes three to five inches in diameter and two to four feet tall. They are translucent to admit light and open-topped to allow rain to enter and the tree to emerge.

In one study, 550 one-year-old seedlings representing 11 common shade tree species were planted at AU. Half were protected by four-foot tree shelters; the others were unsheltered. All were mulched with two cubic feet of pine bark. Environmental conditions were typical of city street plantings: compacted soil covered with a dense sod of grasses and weeds.

Shelters had a strong positive effect on survival during the first 10 months (see table). The effect was great for Florida maple, redbud, sawtooth oak, swamp chestnut oak, and nuttall oak. Except for drought-sensitive katsuratree, survival in shelters was greater than 80%, which is considered excellent.

Averaged over all species, shelters increased first-year height growth almost fivefold. Sheltered sawtooth oaks grew the most, while Florida maples grew the least and actually died back outside the shelters. Slightly less base diameter growth occurred inside shelters — 0.8 inside, compared to 0.9 inches. By reducing light and wind effects on the seedlings, the shelters affect physiological processes that stimulate height growth and slow diameter growth.

In another test, 336 sheltered seedlings were planted in Auburn and Opelika to determine costs, survival, and rate of vandalism. All were planted on public property, usually on street rights-of-way, and mulched with pine bark. Public notices indicated the purpose of the shelters.

On average, it took one person 20-25 minutes to place each tree, including travel time, materials preparation, planting, shelter placement, and clean up. Cost per tree was $8.53, including seedling, shelter, mulch, stake, transportation, and labor. Traditional tree-planting methods cost $40 to $100.

During the first 10 months, less than 20% of the shelters or seedlings were vandalized, and no seedlings died due to direct tampering. The rate of tampering was significantly affected by location. Greatest damage occurred in residential neighborhoods — slightly more near private than near public housing. An intermediate level occurred in parks, and the least occurred in industrial parks and along undeveloped rights-of-way.

For all species tested, shelters provided substantial growth or survival advantages. With the added benefits of protection against lawnmower damage and low cost of installation, tree shelters appear to be a viable, inexpensive alternative for establishing trees in Alabama cities. Additional research is planned to chart long-term survival of sheltered trees and to characterize how the climate within shelters affects tree growth.

Jones is an Assistant Professor, Chappelka is an Associate Professor, and West is a Graduate Student in Forestry.

First-Year Survival of 550 Seedlings Planted With and Without Tree Shelters in Experimental Plots

Species	Survival		Height growth	
	No shelter	With shelter	No shelter	With shelter
	Pct.	*Pct.*	*In.*	*In.*
Acer barbatum (Florida maple)	46	86	-3.7	0.4
Cercis canadensis (Redbud)	45	83	0.4	22.3
Cornus florida (Flowering dogwood)	55	83	3.1	9.1
Cercidiphyllum japonicum (Katsuratree)	8	11	—[1]	—
Fraxinus pennsylvanica (Green ash)	84	100	9.1	29.8
Quercus acutissima (Sawtooth oak)	45	96	5.4	32.6
Quercus alba (White oak)	38	86	3.1	15.8
Quercus michauxii (Swamp chestnut oak)	52	96	0.5	17.4
Quercus nuttallii (Nuttall oak)	59	100	0.0	22.2
Quercus rubra (Northern red oak)	79	100	7.7	21.0
Ulmus parvifolia (Chinese elm)	92	100	5.4	13.0
TOTAL	55	85	3.9	18.5

[1]Data not available due to poor survival.

B.E. Vaughn and K.K. Bost

Quality Medical Care for Children Could Become Rare in Rural Alabama

Congress and legislators throughout the nation are debating the issues surrounding health care availability and costs, but it is rare for the voices of private citizens to be heard in this vital discussion. An ongoing AAES study surveyed concerns and opinions regarding the availability of health care for the most vulnerable members of society — pregnant women and infants. Results indicate that Alabama could face a crisis in the delivery of pre- and postnatal medical care.

Initially, the 1991-93 study sought to determine factors that might lead Alabama obstetricians and pediatricians to continue or discontinue their practices in the state. Responses to this survey revealed that 30 of 67 Alabama counties were without the services of these specialists. Importantly, counties without such physicians tended to be rural. Results further indicated that while many physicians were considering discontinuing their services, the retiring or closing practices were offset by new practices being opened. However, the vast majority of new practices were being opened in larger towns and cities, with a large proportion of rural care providers thinking about closing shop, creating a situation where rural families could face a vacuum of medical services.

In a follow-up survey, researchers polled 1,125 obstetric and pediatric patients. Goals were to determine the use of these services, the sources of support for the services, and travel required to receive the services.

More than 600 of the women responding to this survey work outside the home. Among these women, nearly one-third reported that employer-paid health insurance was a major factor in their decision to hold their respective jobs. An additional 120 women reported that medical benefits were influential in their spouses' work decisions.

Most respondents reported they were satisfied with the quality of care they received from their obstetricians and pediatricians. The vast majority said they would be willing to follow the physicians to new locations within their respective counties. Also, most respondents indicated they could find care of equal quality if their doctors' practices were closed.

However, more than 25% of the women said health care of equal quality would not be available if their current obstetricians or pediatricians left the area. On average, these women reported they would be forced to commute an extra 26 miles each day to reach a physician providing care of equal quality.

Overall, these surveys suggest that rural Alabamians are underserved with respect to the availability of obstetric and pediatric services. There are fewer physicians available to provide these services, a larger portion of obstetricians and pediatricians are considering closing their practices, and the distance traveled to receive these services is greater for rural citizens. If the risk of losing obstetric and pediatric services is realized, these rural residents may find it difficult to replace them with nearby services of equal quality.

As the debates over health care continue in coming months, information from surveys such as this one must be made available to policy makers who can help assure that obstetric and pediatric services are provided in a timely and cost-efficient manner to all citizens, regardless of where they live. These findings indicate that our rural citizens are concerned with health care issues and need sensitive consideration in national and statewide forums.

Vaughn is a Professor and Bost is Ph.D. candidate of Family and Child Development.

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