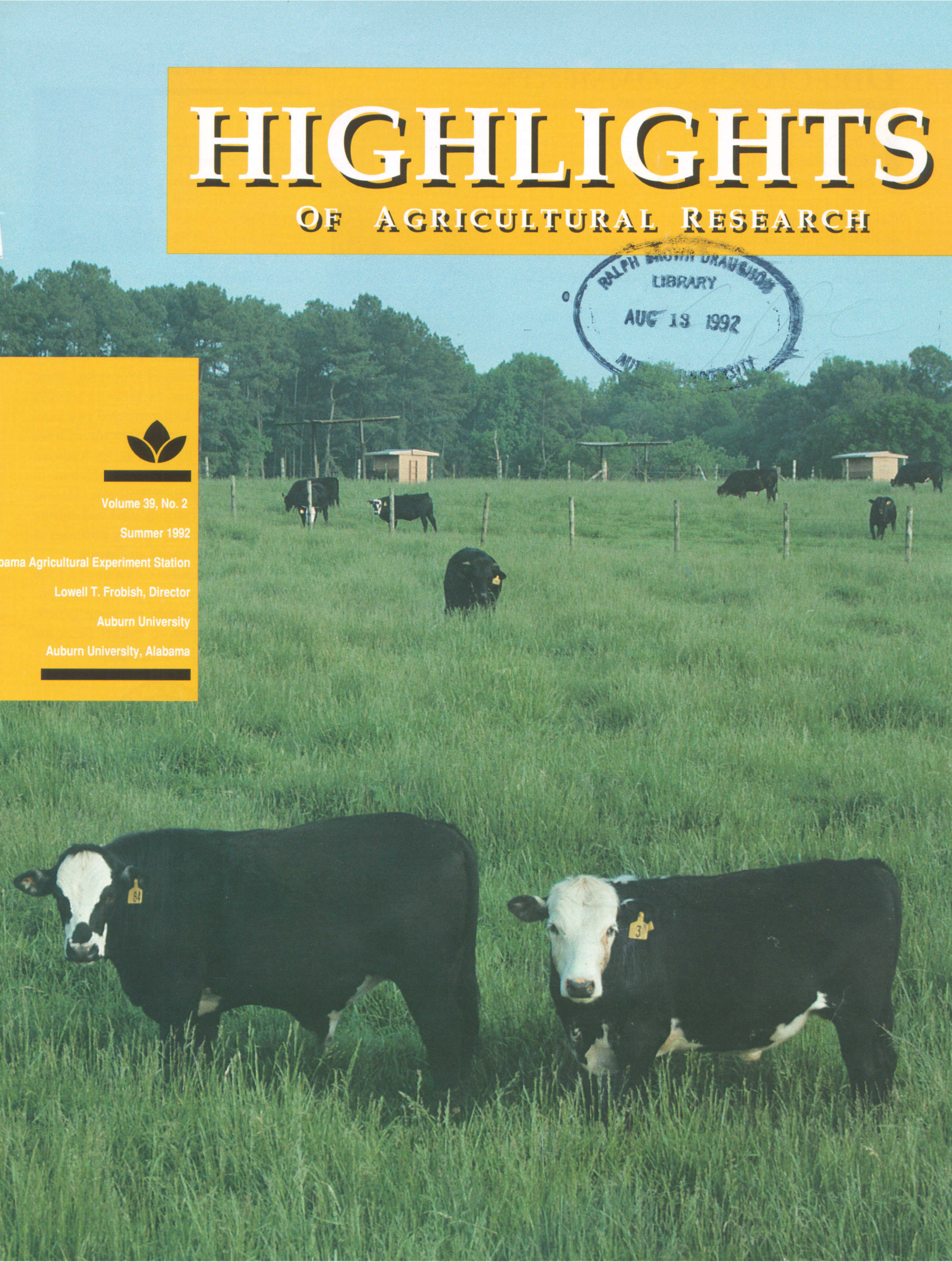
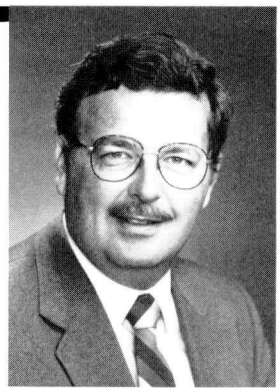
HIGHLIGHTS

OF AGRICULTURAL RESEARCH

Volume 39, No. 2
Summer 1992
bama Agricultural Experiment Station
Lowell T. Frobish, Director
Auburn University
Auburn University, Alabama



Director's Comments



LOWELL T. FROBISH

In late April, the School of Forestry at Auburn hosted an historic meeting. Titled, the "International Conference on Forest Vegetation Management," this meeting attracted scientists and policy makers from six continents and more than 20 nations of the world to Auburn. By hosting this first-of-its-kind international conference, Auburn's School of Forestry further established itself as a leader in forest management, planning, and policy—not just in Alabama, but worldwide.

Still, some people might ask, "what do global warming, worldwide pollution, the spotted owl, and other topics discussed at the conference have to do with me." Auburn University President Dr. William Muse opened the conference, and in his opening remarks, he answered the question of "why" quite succinctly.

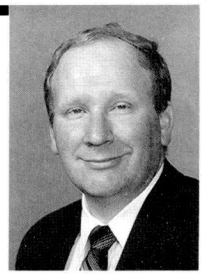
Dr. Muse pointed out that forestry is a nine billion dollar industry in Alabama and that we have about 22 million acres of forest landwhich, represents 67% of the land base. More importantly, we have four things going for us that some other states and most other forest-producing regions of the World don't have: (1) we have the climate to increase production, (2) we have the technology to increase production, (3) we have the social and political incentives to expand our forest industry, and (4) Alabama's forest is 95% privately owned.

Nationally, preservation of the spotted owl in the Pacific Northwest may seem far removed from Alabama. But, if hundreds of thousands of acres are taken out of production there, where will it likely be made up? Most likely in the southeastern United States, with a fare share being in Alabama. Internationally, policy in Australia and New Zealand to prevent destruction of native eucalyptus forests in favor of pines may seem even further removed from Alabama. Again, where will that worldwide loss in pine production be made up—most likely in the southeastern U.S.

As Dr. Muse pointed out, the policy decisions on forest pesticides, forest regeneration, forest species integration, etc. that impact directly on the world's 10 billion acres of commercial forest land, indirectly impact on Alabama's forest industry. Global climate change, pollution, and other environmental factors that are affected by worldwide forest management decisions also directly affect the environment in which we live.

We have a strong forestry research program at Auburn that includes collaborative projects among forest engineers, economists, plant biologists, and others. Global topics discussed at the recent international forestry conference at Auburn seem to augment the belief that the Southeast in general and Alabama in particular will be called upon to produce more timber products in the future. Such production increases don't just happen—they require innovative and intensive research-proven technology.

May We Introduce



Dr. Daryl L. Kuhlers, Professor of Animal and Dairy Sciences. A native of Iowa, Kuhlers joined the Auburn staff in 1978 where his research efforts have focused on increasing pork production through genetic improvement.

Kuhlers earned a B.S. degree in animal science from Iowa State University before going to the University of Wisconsin where he earned a M.S. and the Ph.D. in genetics and meat science and conducted post-doctoral research. He joined the faculty of Iowa State University in 1974 as an Assistant Professor, serving there until he came to Auburn as an Associate Professor. He was promoted to Professor in 1984 and, during 1990-91, he served as visiting professor at the University of Guelph in Canada.

Kuhlers' studies have examined a wide range of genetic issues in pork production.

Results of his study on using genetic selection to get pigs to market faster are reported on page 9 of *Highlights*.

ON THE COVER. Stocker cattle grazing fescue, with broiler litter supplement, see story on page 8.

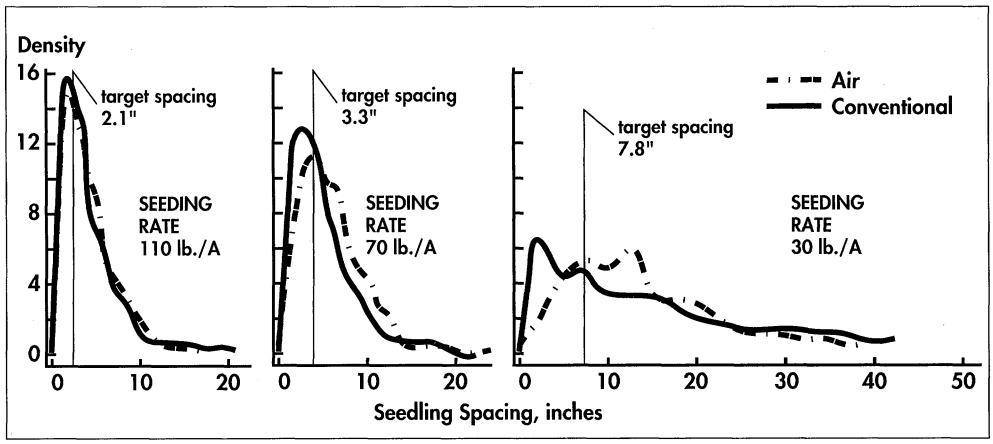
Summer 1992 Vol. 39, No. 2

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

G.R. WEHTJE, L.W. WELLS, AND J.R. WEEKS

PERFORMANCE OF PEANUTS AS INFLUENCED BY SEEDING RATE AND PLANTER

IN RECENT years, "air", or "vacuum", planters have become available to peanut growers. With this planter, individual seeds are picked up and held against a plate with a vacuum before being released into the chute that delivers a seed into an opened furrow. These planters are advertised as being very efficient in achieving an even spacing between seeds, and this added accuracy allows for a reduction in seeding rate compared to rates used with conventional planters, which would result in a cost savings.



Plant spacing using conventional versus vacuum planter at different seeding rates.

Results of AAES research indicate no significant difference in efficiency between vacuum planters and conventional planters. The study also indicates reducing peanut seeding rate, while lowering initial crop investment, may result in lower yields and profit.

An experiment was conducted in 1991 at the Wiregrass Substation, Headland, to evaluate vacuum versus conventional planters. Peanuts were planted at 110, 90, 70, 50, and 30 lb. per acre with both type planters. The normal seeding rate is 90 to 110 lb. per acre. A common lot of peanut seed was used that averaged 750 seed per lb. Both planters were operated at 4 m.p.h.

Germination was low, about 70 percent, but this was typical of seed available during 1991. After peanuts emerged, the exact spacing between individual seedlings was measured over a 10 ft. section of row. Later in the season the occurrence of white mold and tomato spotted wilt virus (TSWV) was determined because the severity of these diseases has been linked to plant populations. Plots were dug at the optimum digging date, and the center two rows harvested for yield determination.

At 110 lb. per acre, the theoretical exact spacing between seedlings is 2.1 in.; and both planters were fairly successful in achieving this spacing, see figure 1. At the 70 lb. per acre rate, the expected spacing between seedlings is 3.3 in. Again, both planters were fairly successful in achieving this spacing; however, compared to 110 lb. per acre, more variation in seedling spacing was observed regardless of planter. At the 30 lb. per acre rate, the theoretical spacing between seedlings was 7.8 in.

The conventional planter tended to have a closer spacing, while the vacuum had a wider spacing. But, for both planters, the overall variation in spacing was very high regardless of planter. At these marginal seeding rates, seedlings are spaced far enough apart to prevent any cooperation among seedlings in cracking open the row. Consequently, stand skips are more frequent.

Peanut yield was influenced by seeding rate, but not by planter, see table 1. Maximum yield was achieved with no less than 90 lb. per acre; lower rates resulted in incremental reductions in yield. As expected, disease was influenced by seeding rate, but not by planter. Higher seeding rates, which resulted in a denser, moisture-holding canopy, had a greater occurrence of white mold, table 2. Thus an excessive seeding rate should not be viewed as insurance of a good stand, but more as a promoter of disease. In contrast to the trend observed with white mold, TSWV was more common with the lower seeding rates. Apparently, the vectoring aphids, which are attracted to open ground, accumulate in plots with a thin stand.

Variation in the spacing between seedlings can result from less than 100% germination, insect and disease losses, and the emerging seedlings having to grow around obstacles. No machine can be expected to completely eliminate this type of variation. At normal peanut seeding rates (i.e., more than 90 lb. per acre) this variation was nearly equal between the vacuum and conventional planters.

TABLE 1. PEANUT YIELD AS INFLUENCED BY PLANTER AND SEEDING RATE

Seeding rate	Planter		
	Vacuum	Conventional	Avg.
Lb./acre	*Lb./acre*		
30	4,154	4,149	4,152
50	4,225	4,647	4,636
70	4,823	4,752	4,788
90	5,000	4,900	4,950
110	4,890	5,061	4,976
Average	4,698	4,702	

TABLE 2. DISEASE OCCURRENCE IN PEANUTS AS INFLUENCED BY SEEDING RATE

Seeding rate	Disease, infections/plot	
	TSWV	White mold
Lb./a		
30	6.0	2.9
50	3.5	3.5
70	2.9	3.7
90	2.4	3.7
110	2.6	4.2

Wehtje is Professor of Agronomy and Soils; Wells is Assistant Superintendent, Wiregrass Substation; and Weeks is Associate Professor of Entomology.

L.V. PURVIS, B.K. BEHE, C.H. GILLIAM, AND J.O. DONALD

Composted Broiler Litter is Acceptable in a Horticulture Potting Mix

In 1990, Alabama's poultry industry produced 3.6 billion lbs. of broiler litter. Though litter can be used as fertilizer and as a protein extender in some livestock feed, these uses have not kept pace with production and new uses for broiler litter are in constant demand.

Past research demonstrated the feasibility of using composted litter in a medium to grow horticultural plants. However, odor problems were thought to be a potential limitation to consumer acceptability of such a potting mixture. An Alabama Agricultural Experiment Station study was conducted to evaluate marketability of a "soilless" growing media amended with composted broiler litter and to determine if this product could be used in the home.

The study was conducted in consumers' homes to ensure a realistic setting. Dallas Jewel, a fern cultivar that performs well as a houseplant, was selected for the study because of its tolerance to low light and low humidity. A media containing composted broiler litter as a component, called AUmix, was compared with two commercially available media: Baccto® and Hyponex®.

AUmix was comprised by volume of 10 parts composted broiler litter; 10 parts aged, amendment grade pinebark; and 1 part horticultural perlite. After blending, the mixture was screened to ensure particle sizes were no larger than one-fourth in. On Oct. 17, 1990, commercially grown, uniform 1-in. liners of Dallas Jewel were transplanted into 4-in. plastic pots and grown for 1 week in a greenhouse.

Volunteers for the study were recruited from 23 garden and homemaker clubs in Lee County. Of the 119 volunteers, 112 (94%) completed the 6 week study. Between Oct. 24 and Nov. 1, the volunteers randomly chose a set of three plants that were labeled A, B, or C and randomly varied by the potting mix. Each consumer received an instruction sheet, six color-coded forms for weekly evaluations, and six postage-paid envelopes for returning completed surveys. The participants were asked to rate plants on a five-point scale based on color, water usage, health, and odor[1].

Ferns grown in Hyponex received a lower average color rating (3.0) indicating they were lighter green when compared to the other two media. Ferns grown in AUmix and Baccto had similar overall mean color ratings, 3.6 and 3.7, respectively. Ferns grown in Baccto were rated as using less water (2.4) when compared to ferns grown in Hyponex (3.3). Ferns grown in AUmix required an intermediate amount of water (2.7).

Ferns planted in Hyponex received a lower average mean rating for fern health (3.1) than plants grown in the AUmix (3.6) or Baccto (3.7). The overall average odor ratings for ferns grown in Baccto (1.1) and Hyponex (1.1) were 2% lower than ferns grown in the AUmix (1.2). Although AUmix had a slightly less pleasant odor than either Baccto or Hyponex, the difference, while statistically different, was not substantial. AUmix performed as well as Baccto in sustaining fern health and overall color, and better than Hyponex in fern health, color, and water requirements.

Because AUmix was able to sustain plant growth as well as or better than the two commercially produced media, it appears that a growing medium amended with composted broiler litter is acceptable and could be marketed for use in consumer homes.

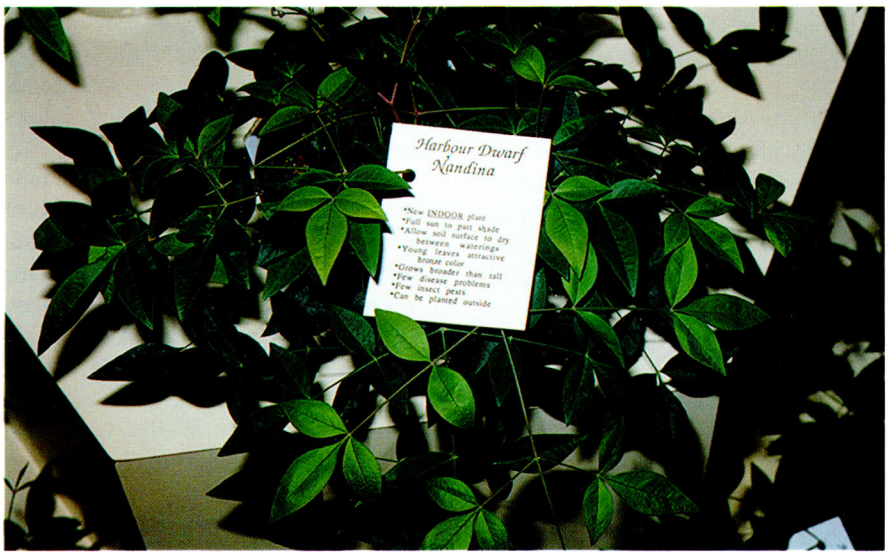
[1] Color= 1 is light green, 5 is dark green; water usage = 1 is less needed, 5 is more water needed; health = 1 is fair health, 5 is good health; and odor = 1 is no odor, 5 is strong odor.

Dallas Jewel ferns growing in various potting mediums.

Purvis is Graduate Research Assistant, Behe is Assistant Professor, and Gilliam is Professor of Horticulture; Donald is Professor of Agricultural Engineering.

B.K. BEHE, C.F. DENEKE, AND G.J. KEEVER

New Nandina Varieties Show Promise for Supermarket Sales



Harbour Dwarf nandina, as shown here, sold well in consumer tests.

PRODUCTION and sales of foliage plants have been slowly increasing during the past 10 years, indicating that the market has matured. New or improved products are introduced to restart sales and generate profits, and new varieties of foliage plants can provide a profitable push to help stimulate slow-growing sales.

A nandina variety, commonly known as heavenly bamboo, has shown promise as an indoor foliage plant. An Alabama Agricultural Experiment Station study was conducted to determine the postproduction life and market potential for two varieties of nandina, San Gabriel and Harbour Dwarf, as indoor foliage plants.

Tissue cultured plants were transplanted into 4-in. pots and grown under 30%, 47%, and 62% shade for 32 weeks. After production, plants were placed in a simulated consumer environment at 70°F and evaluated based on a five-point scale[1]. After 35 weeks in this environment, both varieties of nandina were evaluated again for overall plant quality.

In the experiment designed to determine post-production life, Harbour Dwarf grown under 62% shade had a final plant quality rating significantly higher than that for the 30% or 47% shade treatment. The initial quality ratings of San Gabriel produced under the 62% and 47% shade were greater than those of plants grown under 30% shade, but production shade levels had no influence on the final quality rating.

Plant quality ratings of San Gabriel were initially higher than those for Harbour Dwarf; however, quality ratings of Harbour Dwarf grown under 62% shade decreased from 4.5 to 4.0 during the 35-week evaluation, while the quality ratings of San Gabriel grown under 47% or 62% shade dropped from 5.0 to 3.0.

In a second experiment, designed to determine market potential, plants were grown for 12 to 16 weeks in a greenhouse with a minimum night air temperature of 65°F, then placed in test markets. Customers were provided information pertaining to identification and care of the plant and given a self-addressed, stamped postcard survey form to complete and return.

Test plants were sold during 1990 at retail locations in Birmingham, Auburn, and Opelika, and in two Columbus, Ohio, supermarket floral departments. Ten plants of each variety were tested in separate 4-week studies at each location. Harbour Dwarf was evaluated from Sept. 25 to Oct. 23, and San Gabriel was evaluated from Oct. 23 to Nov. 23. A total of 60 Harbour Dwarf and 60 San Gabriel plants were distributed to six stores in the 8-week period. Direct costs of production were $2.05 for Harbour Dwarf and $1.32 for San Gabriel. Plants were test marketed at a price of $2.99, comparable to the price of other foliage plants in the same size container.

Sales of all 4- to 6-in. foliage plants averaged 12.2 plants per store per week. Sales of the nandina varieties averaged 1.9 plants per store per week. Thus, Harbour Dwarf and San Gabriel captured 16% of the market for 4- to 6-in. foliage plants.

Forty of 120 postcards were returned (30% response rate). Consumers were asked to rate the importance of six characteristics pertaining to the foliage plants: newness of the plant, ability to use the plant inside the home, its pest and disease resistance, small size of the plant, price, and form of the plant.

Attributes rated as most important by respondents include newness, 60%; problem free, 50%; use inside, 47%; price, 38%; small size, 35%; and form, 29%. Only 29% rated price as important, 16% rated form of the plant important, and 14% rated use inside as important.

The consumer perception reported here, combined with the sales data, indicate that the nandina varieties Harbour Dwarf and San Gabriel have good potential in the marketplace as interior foliage plants. Although both varietes performed well in an interior environment, the quality ratings of San Gabriel decreased more than those of Harbour Dwarf during the 35-week postproduction evaluation. Market information indicated that consumers appreciate these varieties for their newness and were willing to purchase them at a price similar to other foliage plants of the same size.

Behe and Deneke are Assistant Professors and Keever is Associate Professor of Horticulture.

1 Rating scale is from 1 to 5, with 1 = unsalable, 3 = salable, green leaves, some leaflet abscission; 5 = full, dark green leaves.

R.J. MITCHELL, G.B. RUNION, W.D. KELLEY, AND D.H. GJERSTAD

Factors Associated with Pine Mortality on Former Agricultural Sites

PINE regeneration is big business in Alabama. More than 1.5 billion pine seedlings are planted annually in the southeastern United States. Many farmers in Alabama are converting sites from row-crop agriculture to forest production due to an ever-changing economic climate and government programs, such as the Conservation Reserve Program (CRP). Through the CRP alone, more than 1.5 million acres of erodible cropland in the South were converted to pine plantations.

A number of unexpected problems have been encountered in this massive regeneration effort. One particularly serious problem is the poor seedling survival experienced on a number of sites. In some counties, the failure rate was nearly two failures for every five plantations. On many of these sites, repeated planting resulted in repeated failure due to pine mortality.

Although few data were available to determine the cause of these failures, a number of factors were suspected. Among these were residual herbicides from past farming practices (such as growing soybeans), herbicides used in the pine plantations to control competition, plant diseases and/or nematodes, and root feeding insects commonly found in agricultural fields. Alabama Agricultural Experiment Station investigators conducted field studies during a 2-year period to determine if any of these factors, alone or in combination, contributed to the excessive pine seedling mortality.

The first study involved applying five common soybean herbicides (Prowl®, Treflan®, Basagran®, Blazer®, and Scepter®) at 1, 2, and 4 times the labeled rates on a typical coastal plain site in the summer before pines were planted. The following December, pine trees were planted and mortality was assessed mid-way through the growing season and at the end of the first growing season in the field.

In this test, tree survival was high (greater than 80%) in all treatments, suggesting that residual herbicides from past practices were not major factors in the observed pine mortality.

The second study was conducted at five locations throughout the coastal plain of Georgia representing typical CRP sites ranging in soil pH from fairly acidic (4.8) to reasonably basic (6.5). A major premise of this study was that increased Oust® solubility on the more basic sites predisposed pine seedlings to herbicide damage and eventual death. Oust solubility increases rapidly when the pH of the solution is basic. On each site, Oust was applied at three rates (0, 4, and 8 oz. per acre).

Contrary to expectations, results showed that Oust was not the cause of mortality. However, root feeding by white fringe beetle larvae and other species of white grubs was found on nearly all trees that died.

A third study was done to determine if use of an insecticide (root dips with furadan when the seedlings were planted followed by a soil treatment at mid-season) might reduce feeding and improve survival.

More than twice the number of non-treated seedlings died compared to those treated. The frequency of root feeding was dramatically reduced with the root dip insecticide treatment, however the effects were short lived. By the middle of the growing season a soil treatment was required. It was found that those sites with significant mortality always had grubs present, while grub-free sites had good survival rates.

Numerous fungi also were isolated from the root systems of seedlings grown in these studies but, although a number of potentially pathogenic fungi were found, no direct link to mortality was identified. Lastly, nematodes, reported to be harmful to pine seedlings, were found in the rhizospere of pine seedlings. However, this also could not be directly related to the mortality observed in the studies. Nevertheless, the interaction of root pathogenic fungi and nematodes may have been important, though more work is needed to determine their role in seedling mortality.

In summary, pine mortality on agricultural fields was not related to herbicides, either residual from past agricultural activities or those used in pine culture. Pine mortality was closely associated with root feeding by grubs, and using an insecticide to control grub feeding reduced mortality significantly. Fungal diseases and nematodes may be involved with some pine mortality, but their roles appear to be less important than root feeding insects.

These results suggest that landowners planting pines in areas that were recently farmed, particularly abandoned soybean or peanut fields, should carefully assess the presence or absence of grubs.

Mitchell is Associate Professor, Runion is Microbiologist, USDA-ARS National Soils Dynamics Laboratory, and Kelley and Gjerstad are Professors of Forestry.

J.H. WILHOIT, C.W. WOOD, AND K.H. YOO

POULTRY LITTER SPREADER PATTERNS EVALUATED

AFTER poultry litter is spread on pasture land, light green streaks in the direction of spreader travel are often noticed on the grass, indicating an uneven nutrient distribution across the field. The cause of this was the focus of an Alabama Agricultural Experiment Station (AAES) study.

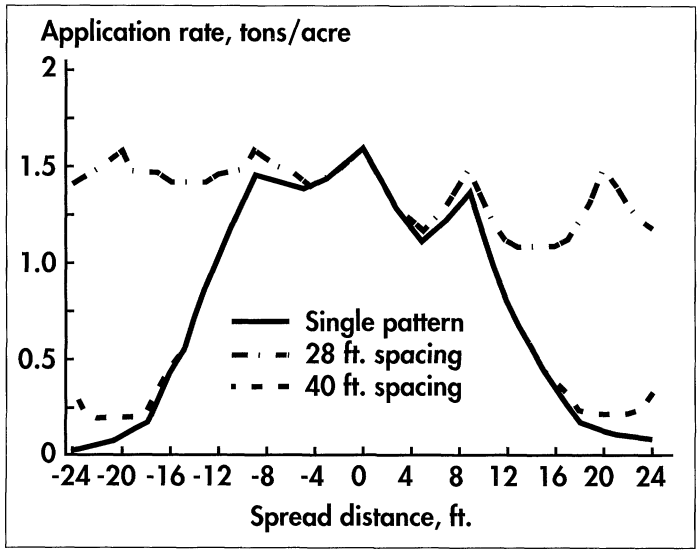
Poultry litter is typically applied to agricultural land using spreaders similar to the type used for broadcasting granular fertilizers. Poultry litter can be quite variable, but tends to be characterized by similar particle types; fine material that appears to come primarily from the manure, intermediate-size particles of wood or peanut hulls, and larger clumps of caked material consisting of wood or peanut hulls, feathers, and manure.

These particle types may contain different proportions of manure, the primary source of nutrients in litter, so the nutrient content of litter could vary with the particle type. Particles of different sizes and densities also have different throw characteristics, so variation in nutrient content with particle type could account for nonuniform distribution of nutrients across the swath.

In the AAES study, a pull-type spreader distributing poultry litter was driven over the center of a set of evenly spaced collection pans three times. Poultry litter samples also were collected on a tarp spread across the swath. Samples were sieved, and N and C concentrations were determined for each sieve fraction of the tarp samples.

An analysis of the particle size distribution data from the samples collected from the pans showed a concentration of smaller-size material closer to the center of the spreader. Most of the particles smaller than a 16-mesh sieve (0.0469-in.) landed within a distance of 12 ft. to either side of the spreader, while the particles larger than this were spread much more evenly out to a distance of 20 ft. to either side.

The results of the laboratory analysis on the different particle size fractions (collected from the tarp) showed a consistent increase in C concentration with increased particle size, from an average of 26% for the smallest size fraction to 43% for the largest. The N concentration varied randomly from 3.2% to 4.3% for the different size fractions, however, giving no indication of higher manure concentrations for the smaller size particles. Accordingly, the average nitrogen concentration in the pans spaced across the swath was relatively constant.



Application rate and spreading of poultry litter.

The weight of litter collected in the pans was used to calculate application rates and to determine distribution uniformity for different possible travel spacings (swath widths) with the spreader. Uniformity was assessed by calculating a coefficient of variation (CV, expressed in percent, with the best uniformity indicated by the lowest percentage) for the amount of litter, including simulated overlap for the different travel spacings, collected in the pans spread across the swath.

The table shows the CV and application rate results (average of three trials) for simulated swath widths from 24 to 40 ft. The minimum CV value was 11% at a swath width of 28 ft. This result was consistent for all three trials. The application rate at a 28-ft. spacing was 1.39 tons per acre. The figure shows the distribution pattern for one of the trials and the simulated pattern (including the overlap) for the 28-ft. spacing.

The operator's manual for the spreader recommended a 40-ft. swath width and indicated an application rate of 1.3 tons per acre for the spreader gate setting and bulk density of litter used in this test. At a 40-ft. spacing, the application uniformity obtained during this test would have been very poor, as indicated by a CV of 50% and shown in the figure. The application rate also was much lower, only 0.96 tons per acre at a 40-ft. swath width, see table. These results suggest that travel spacings used when spreading poultry litter may need to be somewhat lower than the manufacturer's recommendation.

Based on this study, uneven nutrient distributions often obtained when spreading poultry litter are probably due to travel spacings that are too wide rather than to differences in nutrient concentrations and throw characteristics for different size litter particles.

Wilhoit is Assistant Professor of Agricultural Engineering; Wood is Assistant Professor of Agronomy and Soils; and Yoo is Associate Professor of Agricultural Engineering.

POULTRY LITTER DISTRIBUTION UNIFORMITY AND APPLICATION RATES FOR SIMULATED OVERLAPPING SWATHS

Swath width rate	Application	Coefficient of variation
Ft.	*Tons/acre*	*Pct.*
24	1.63	16
26	1.50	12
28	1.39	11
30	1.29	15
32	1.21	22
34	1.13	30
36	1.06	37
38	1.01	43
40	0.96	50

D.I. BRANSBY AND J.T. EASON

Remarkable Profit Made from Stockers on Fescue-Broiler Litter Systems

ROW CROPS are generally regarded as more profitable than beef enterprises. However, an Alabama Agricultural Experiment Station Study conducted at the Sand Mountain Substation, Crossville, showed that stockers raised on tall fescue fertilized with broiler litter can be economically competitive with row crops.

In the fall-winter-spring periods of 1988-89 and 1989-90, infected and fungus-free Kentucky 31 tall fescue pastures were grazed by Angus and Angus-Hereford steers with an average initial weight of 460 lb. Animals on half the pastures were allowed free access to a 50:50 broiler litter:shelled corn supplement in self-feeders. Stocking rates were 1.5 to 3.0 animals per acre without supplement, and 2.0 to 3.5 animals per acre with supplementation. Grazing started in October and continued through July.

Animals in the grazing-only paddocks were removed from pasture for 80 to 90 days in mid-winter. During this time they were fed a 50:50 broiler litter:shelled corn diet only. Animals with supplement remained on pasture throughout the winter. Pastures were continuously grazed and stocking rates were not altered over time. All pastures were fertilized with 2.5 tons of broiler litter per acre in fall and spring.

The cost of broiler litter was $10 per ton for fertilizer, but $20 per ton as a feed ingredient due to the additional processing involved. Shelled corn cost $106 per ton. Buying price of steers was $87.39 per hundredweight (cwt). Steers that were not supplemented were sold at the sale yard for an average price of $80.67 per cwt. Those that were supplemented were sold to a packing house for an average of $71.74 per cwt.

Production and economic information for only the economic optimum stocking rates on infected and fungus-free fescue in 1989-90 are shown in table 1 for steers that were not supplemented. Table 2 shows data for those that were supplemented. For nonsupplemented steers, the economic optimum stocking rate was higher for infected fescue than on fungus-free pastures, reflecting higher productivity and carrying capacity. However, animal weight gain was higher with fungus-free fescue on both pasture and winter feed phases of production. The net result was similar gains per acre.

In contrast, costs were higher and returns were lower for infected fescue than for fungus-free fescue. This was caused primarily by the costs associated with carrying more animals on infected fescue to achieve gains per acre similar to fungus-free fescue.

Black baldy steers on test at the Sand Mountain Substation.

Even though returns on fungus-free fescue were higher than on infected fescue, gross margins for both were extremely attractive and competitive with those commonly achieved with row crops. However, this could change if cattle prices drop. Furthermore, producers who already have infected fescue pastures would have to decide whether pasture replacement is worth the risk associated with the lower stress (drought, heat, insects, and heavy grazing) tolerance and higher management requirements for sustained production from fungus-free fescue.

Although animal weight gain and the percent choice grades obtained for supplemented steers were impressive, economic returns were disappointing when compared to nonsupplemented steers. The reduced gross margins for supplemented steers were caused primarily by the cost of supplementation and the lower selling price obtained for finished cattle, relative to the nonsupplemented animals that were sold as feeders.

Bransby is Professor of Agronomy and Soils; Eason is Superintendent, Sand Mountain Substation.

Table 1. Production and Economic Data for Steers That Were Not Supplemented on Infected and Fungus-Free Fescue Pastures, 1989-90

	Infected	Fungus-free
Production data		
Economic optimum stock rate, head/ac.	3.0	2.0
Pasture average daily gain, lb.	.90	1.50
Winter feed average daily gain, lb.	1.42	1.78
Overall 293 day avg. daily gain, lb.	1.02	1.58
Total gain/ac., lb.	897	926
Economic data		
Cost per lb. of gain, dol.	0.38	0.30
Total costs per acre, dol.[1]	1,547	1,081
Total income per acre, dol.	1,837	1,489
Gross margin per acre, dol.	290	408
Gross margin per head, dol.	97	204

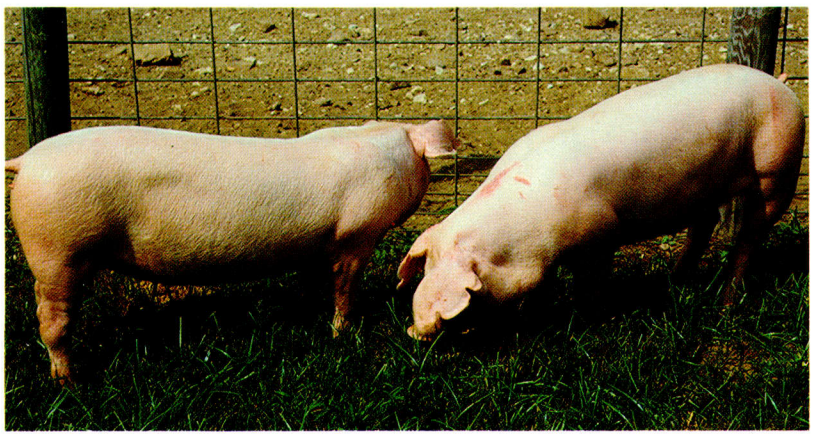
[1] These costs include purchase price of animals and interest on that investment, but do not include fixed costs such as land and labor.

Table 2. Production and Economic Data for Steers That Were Supplemented on Infected and Fungus-Free Fescue Pastures, 1989-90

	Infected	Fungus-free
Production data		
Economic optimum stock rate, head/ac.	3.5	3.5
Pasture average daily gain, lb.	1.70	1.83
Feed consumed per lb. of gain, lb.	10.5	10.0
Economic data		
Cost per lb. of gain, dol.	0.48	0.45
Gross margin per acre, dol.	180	265
Gross margin per head, dol.	51	76

D.L. KUHLERS AND S.B. JUNGST

GENETIC SELECTION FOR GROWTH GETS PIGS TO MARKET FASTER



Landrace pigs selected specifically for 200-day weights.

IT may not matter if pigs of nursery rhyme fame go to market or stay home, but many pork producers want their pigs to go to market as quickly as possible, because each day a pig remains on the farm, labor and feed costs increase. Fast growing pigs will not only help reduce these costs, but will allow producers to cash in on their investments sooner.

Research at the Alabama Agricultural Experiment Station shows genetic selection for rapid growth to 200 days of age in pigs can shorten the time for the pigs to reach market weight and save producers money.

In the test, a line of Land-race and a line of Duroc pigs were selected specifically for 200-day weights and were compared to a line of Landrace and a line of Duroc pigs in which no selection was prac-ticed. The experimental lines were started in 1982 using a single herd of Landrace and Duroc pigs. All the pigs were weighed at 200 days of age. One line from each of the breeds was selected for heavier 200-day weight (select line). A second line, one from each breed, was randomly selected and randomly bred (control line). All other production characteristics, except 200-day weight, were ignored in making selection decisions throughout the test.

Management of pigs from the select and control lines for both breeds was as similar as possible, with both select and control-line pigs of each breed reared in the same building and fed the same diets at the same intervals. Weights of the pigs were recorded at birth, at 35 days (weaning), and at 200 days of age. An ultrasound backfat thickness measurement was made at 200 days of age and was adjusted to the average weight of 220 lb. for each pig. Since this was a closed herd (no outside breeding stock was introduced into either breeding line) and the lines were small (8 boars and 16 sows in each select line), the inbreeding of the pigs increased to about 21% in the Duroc select line and 18% in the Landrace select line.

After 6 years of selection, the Landrace select-line pigs averaged 51.4 lb. and the Duroc select-line pigs weighed 32.2 lb. more than pigs in the control lines at 200 days of age, see table. This corresponds to heritabilities of 26% and 23% for the Landrace and Duroc lines, respectively. However, similarities between the two breeds end here. At birth, the Landrace select-line pigs weighed 0.21 lb. more than the control-line pigs, whereas the Duroc select-line pigs were 0.33 lb. less than the control-line pigs. Similarly at weaning, the Landrace select-line pigs were 4.2 lb. heavier than the control-line pigs, while the Duroc select-line pigs were 1.2 lb. lighter than the control-line pigs.

At 200-days of age, the select-line pigs from both breeds were considerably fatter than the control-line animals. However, they also weighed substantially more. Since backfat thickness increases as weight increases, adjustments to the backfat measurements were made to estimate what the backfat measurements would have been at the same weight. When this was done, no difference between the backfat thickness of the Landrace select- and control-line pigs existed. However, even after adjustment, the Duroc select-line pigs were still 0.12 in. fatter than the control-line pigs.

Even though results for increasing 200-day weight were similar between the two breeds, the effects on other production traits were different. This study indicates genetic selection for heavier 200-day weight is an effective way to increase birth and weaning weights in Landrace, but not in Duroc pigs.

Leanness is important to the swine industry. In this selection experiment, neither breed showed improvement in adjusted backfat thickness. In fact, the Duroc select-line pigs were fatter than their unselected control-line pigs. Even though pigs reached market weight more rapidly with the genetic selection for 200-day weight, no genetic improvement in backfat thickness was shown.

To accomplish the dual industry goals of faster growth rates and reduced fat in pork, results of this study indicate that a selection program emphasizing both growth rate and backfat thickness should be used by purebred breeders and commercial producers alike.

Kuhlers is Professor and Jungst is Research Associate of Animal and Dairy Sciences.

WEIGHTS AND BACKFAT THICKNESSES OF SELECT VS. CONTROL PIGS AFTER SIX YEARS OF SELECTION FOR INCREASED 200-DAY WEIGHT

Trait	Landrace		Duroc	
	Select	Control	Select	Control
Weights				
Birth, lb.	3.65	3.44	2.62	2.95
Weaning, lb.	19.5	15.3	11.3	12.5
200-days, lb.	256.2	204.8	230.6	198.4
Backfat thickness				
200-days, in.	.92	.72	.89	.65
Adjusted for wt.	.77	.75	.87	.75

T.P. MACK AND D.P. DAVIS

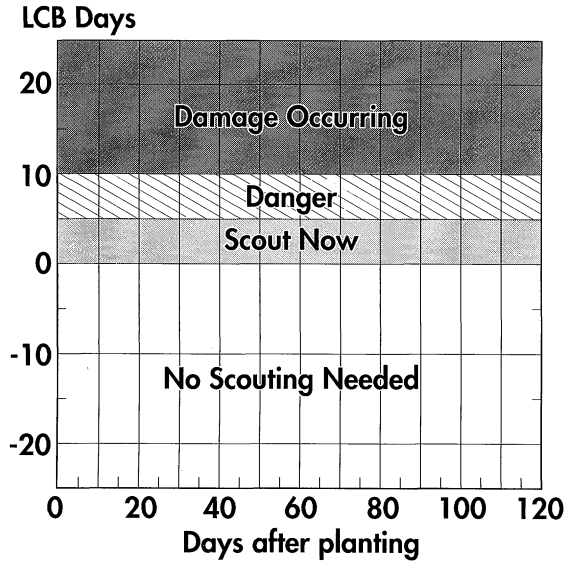
WEATHER VARIABLES AID IN PREDICTING ABUNDANCE OF LESSER CORNSTALK BORER

THE LESSER cornstalk borer (LCB), a major pest of peanuts grown in Alabama, can severely limit yields of peanuts when larvae feed on the crown and developing pods and pegs of peanut plants. Population outbreaks of this insect occur in hot, dry weather in peanuts grown in sandy soils.

Research on LCB at the Alabama Agricultural Experiment Station has focused on the life history of this pest and how weather influences population outbreaks. Since all factors known to contribute to outbreaks involve hot, dry weather, researchers began to explore the possibility that certain variables could be developed to predict outbreaks based on weather.

Such a prediction system would be extremely useful to anticipate outbreaks of this insect, because scouting for larvae is time-consuming and growers often start scouting after damage occurs. Many growers apply a preventative application of a granular insecticide for control of larvae. However, all the insecticides used for management of LCB degrade in as few as 19 days in hot, dry weather. An insecticide applied too early also will degrade, leaving plants unprotected. If treatments are applied too late, much of the damage to peanut plants already will have occurred and yield will decline.

Through this research, a prediction equation was developed by simplifying a complex simulation model. This equation uses a single variable incorporating positive effects of hot, dry weather and the negative effects of normal, wetter weather.



The equation developed is $Y=(H-W)$. In this equation, Y is equal to the LCB-days and represents the cumulative effect of weather on larval abundance; H is the number of days where the temperature is 95°F or higher and less than 0.1 in. of rainfall occurs; W is the number of days that the temperature is less than 95°F and 0.1 in. of rainfall or more occurred. The variable H represents days that contribute to the development of population outbreaks, and W represents days that produce a lower population. Neutral days (i.e., more than or equal to 95°F and more than or equal to 0.1-in. rainfall) do not contribute to LCB-days. Thus, LCB-days are a running total of the cumulative weather events since planting. A cumulative total of 0-10 LCB-days at 30 or more days after planting means that scouting fields for the lesser cornstalk borer is needed.

The usefulness of LCB-days was tested in four validation experiments done at the Wiregrass Substation, Headland, in 1989 and 1990. The tests determined whether or not an application of a granular insecticide for control of the lesser cornstalk borer at a given number of LCB-days increased yield. Conventionally tilled and planted Sunrunner peanuts were used in both years. If LCB-days were positive and a treatment was suggested, a granular insecticide was applied and yields were compared from treated and untreated plots. If LCB-days were negative, it was validated that no yield increase would ensue if pesticide was used, as compared with untreated plots. The granular insecticide used was chlorpyrifos (Lorsban®) applied at 2 lb. active ingredient per acre in a band application over the row.

Plots were surveyed weekly for damage. Soil was sieved weekly, or when dry enough to be sieved during the growing season, to determine the number of larvae present. Yields were taken from the center two rows of each plot at crop maturity.

LCB-days were mostly negative in 1989 and lesser cornstalk borers were rarely found. Insecticide applied at negative values of LCB-days did not increase yields, compared with yields in the untreated plots. In the outbreak year (1990), LCB-days exceeded 35 and lesser cornstalk borers were abundant. More than 10 larvae per yd. were found in some fields. Insecticide applied at 0, 5, or 8 LCB-days increased yield compared with yield in nontreated plots, and insecticide applied at more than 20 LCB-days either did not increase yield or actually decreased yield.

These studies verify that LCB-days are useful in timing scouting and applications of insecticide. A three-tiered approach can be used with LCB-days, as shown in the figure, which suggests scouting at less than 0 LCB-days, danger at 5-10 LCB-days, and damage occurring at more than 10 LCB-days. Growers must record the amount of daily rainfall and daily maximum temperatures in each field throughout the growing season and calculate LCB-days from planting.

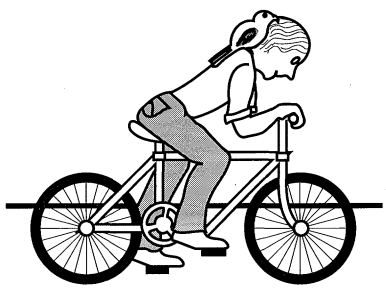
Mack is Associate Professor and Davis is former Post Doctoral Fellow of Entomology.

J.F PITTMAN AND L.K. LAMKE

FACTORS AFFECTING THE DECISION TO MOVE AND CHANGE JOBS

WHY do people move and are there factors that can help predict the decision to move? These questions have been particularly salient in recent years as data have revealed various patterns of migration away from rural regions.

Census reports show that during the 5-year period prior to the 1980 census, 46.4% of the nation's population moved. This trend also was seen in the southern region of the United States (Texas to Delware and bounded by Maryland, West Virginia, Kentucky, Arkansas, and Oklahoma) where 46% of the population changed residences.



Comparing national trends to the South, roughly the same percentage of the population moved, but in the South, more moved out of county and state. Alabama reveals a more stable population. A smaller proportion of the population (42%) moved in the same 5-year period, and more Alabamians (60.8%) relocated in the same county, while somewhat fewer residents (23.3%) moved out of State.

Though this indicates Alabama has a more stable population compared to the rest of the region and country, rates on in-migration and out-migration offer a less satisfying picture. While data indicate an impressive rate of population growth in the South, Alabama data show that out-migration is high in this State. For every 100 people who moved into the State during the 5-year period, 80.2 others left, and, for each 100 employed people moving into Alabama during this same period, 89.7 left the State. These figures suggest a slow rate of growth compared to the rest of the region and a prominent loss of talent, given the great numbers of employed people leaving the State.

To evaluate the reasons for this movement, a survey was conducted through a large central Alabama daily newspaper that attempted to analyze this trend. The researchers assumed that the tendency to move and the tendency to change jobs could be used as an index of a person's or household's willingness or intent to change. The researchers also assumed that opportunity and motivation factors were both involved.

The survey obtained 330 respondents, though analysis was limited to the 290 respondents who had paying jobs. The sample was largely white (92.4%) and married (67.9%). Ages ranged from 22 to 71 and the average age was 42.7 years. Some 58% of the sample were women and approximately half the sample were parents with an average of 1.6 children. Typical education level was "some college" and typical income level was $35,000 to $45,000 annual income. Most (78%) owned their home, and more than 75% had moved at least once in the previous 10 years (average moves in that period, 2.8).

Five variables were evaluated for mobility and/or job change: ties to the community, marketability of job skills, community satisfaction, job satisfaction, and quality of life.

Two variables, marketability and community ties, seemed to best represent "opportunity." Marketability measured the respondents' beliefs that they possessed job skills that could earn them comparable or better wages in alternative employment. The more marketable a person was, the greater tendency they showed to change. Community ties involved home ownership, the number of years lived in the community, and the nearness of relatives. The greater the community ties, the less changeable respondents felt.

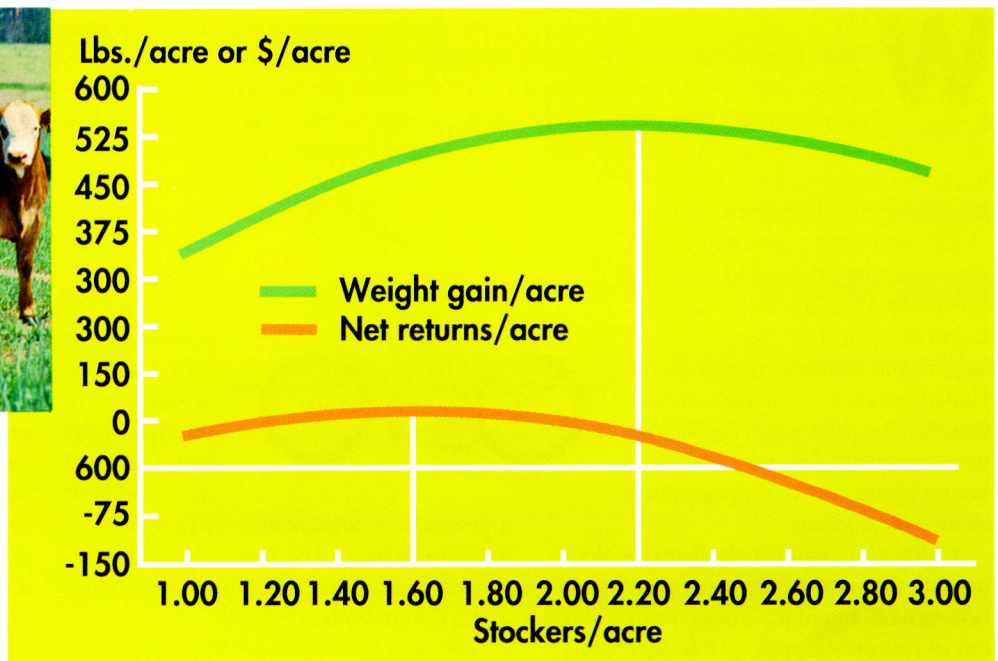
The other three factors represented motivators for change and measured respondents' feelings of satisfaction with various aspects of their lives. The strongest predictor of changeability was satisfaction with the community of residence. People who were more satisfied with their community were less likely to move away than those who were less satisfied. Job satisfaction was the second most motivating factor, and changeability increased as job satisfaction decreased. Quality of life measured satisfaction with respondents' lives, including family and marital relationships. Greater changeability was predicted by lower levels of satisfaction. However, the relationship between changeability and quality of life was weaker than the other two factors. This is probably due to the reasoning that people do not escape life and family in a move, and the tendency to make changes would likely result from a belief that a change in environment would improve family relations.

These data indicate that both opportunity and motivating factors help explain a willingness to change in this sample. Those with more marketable skills and fewer community ties were more likely to consider moving or changing jobs, as were people who were less satisfied with their community, jobs, and life in general.

Pittman and Lamke are Associate Professors of Family and Child Development.

S.O. OLOWOLAYEMO, J.C. REEVES, N.R. MARTIN, JR., R.R. HARRIS, AND D.I. BRANSBY

Economics and Efficiency Factors for Optimal Stocking Rate



Biological versus economical optimum for beef cattle.

TO EFFICIENTLY utilize forage, beef producers want to know the highest stocking rate that will produce the greatest gains. However, research is showing that the optimal stocking rate for production of gain is not always the most economically beneficial rate.

An Alabama Agricultural Experiment Station study was conducted from 1987-89 to determine what stocking rate provided the best gains and profit. Data were collected at the Gulf Coast Substation, Fairhope, from eight pastures with stocking rates of 1-3 beef steers per acre. Four were planted with a mixture of rye, ryegrass, and clover, while the remaining four pastures contained only rye and ryegrass.

The study recorded weight gain per acre and return per acre in response to average initial placement weight of steers, number of days on grazing, stocking rate, the presence or absence of clover, and amount of supplemental hay consumed. In 1988, cold weather in midwinter forced the removal of animals from pastures for 30 days.

Net returns were calculated using budgeting similar to that used for a farm-scale stocker enterprise. Purchase and selling prices for stockers were $.90 and $.80 per pound, respectively. These prices reflect a $.10 per pound negative margin observed during the late 1980's in Alabama.

Analysis showed that stocking rates and presence of clover were the most important variables in determining weight gain and profit per acre. On average, presence of clover increased average daily gain by 0.2 lb. per day (1.91 versus 1.71 lb. per day) and an increase in stocking rate of 1 steer per acre (between 1 and 3 steers per acre) reduced average daily gain by 0.6 lb. per day. The effect of clover could be due to beneficial forage late in the grazing periods when quality of rye or ryegrass decreases.

Results indicate that the stocking rate at which return per acre is maximized (1.57 steers per acre) is lower than the stocking rate at which gain per acre is maximized (2.22 steers per acre), which is consistent with general production economics theory. Therefore decision makers must take into account input costs as well as physical output and value in order to maximize profits.

The figure illustrates the difference between the optimal biological stocking rate and the optimal economic stocking rate. The biological optimum is shown at the point which corresponds with maximum weight gain per acre. The economic optimum is determined by total revenue and cost. When stocking rate exceeds 1.57 head per acre, the cost of producing an extra pound of gain is not covered by the return generated by the extra pound of gain.

This study indicated that stocking rate and the presence of clover are the most important variables in determining both the weight gain and the net revenue per acre. The results also showed that the optimal economic stocking rate was lower than the optimal biological stocking rate. Therefore, it is imperative for beef producers and other decision makers to consider the costs of inputs, physical outputs, and values in order to maximize profits.

Olowolayemo is Graduate Research Assistant, Reeves is Former Graduate Research Assistant, and Martin is Professor of Agricultural Economics and Rural Sociology; Harris is Professor of Animal and Dairy Sciences; Bransby is Professor of Agronomy and Soils.

R.T. GUDAUSKAS, K.B. BURCH, P. JIN, A.K. HAGAN, AND J.R. WEEKS

VIRUSES INFECTING PEANUTS PREVALENT IN ALABAMA

Symptoms caused by peanut mottle virus.

THE OCCURRENCE and importance of many fungal and nematode incited diseases in peanuts in Alabama are well documented in comparison with viruses attacking this crop. However, a recent Alabama Agricultural Experiment Station (AAES) study showed tomato spotted wilt virus (TSWV), peanut mottle virus (PMV), and peanut stunt virus (PSV) to be widespread in the State.

During 1990-91, leaves from peanut plants showing virus-like symptoms, see figure, were collected from fields selected at random in the 14 counties making up the major peanut production area. Symptoms on suspected virus-infected plants included leaf chlorosis, mottling, necrosis, line patterns, distortion, and overall plant stunting. Leaf samples also were taken in these same fields from plants showing no apparent symptoms. Sap was extracted from all samples and tested for PMV, PSV, TSWV, and peanut stripe virus (PStV) by bioassays on indicator plants in the greenhouse, and by enzyme-linked immunosorbent assay (ELISA) in the laboratory.

PMV and TSWV, singly or in combination, were identified in every county and generally at high frequency in most counties, see table 1. PSV was found in a majority of the counties, but at much lower frequency. No other viruses, including PStV, were identified in any sample during the 2-year period.

A summary of results for all samples presented in table 2 shows that general incidences of TSWV and PSV were about the same in 1990 and 1991, while that of PMV declined in 1991. PMV and TSWV also were detected at rather high incidences in a-symptomatic peanut plants, especially in 1990. Symptoms could have been overlooked or not recognized at the time of collection because many fields surveyed in 1990 were under drought stress, which can confound or obscure symptoms of virus infection.

Results for the total area surveyed showed that PMV and TSWV were detected in samples from a majority of the fields in all 14 counties, table 3. PSV was detected in about one-fourth of the fields surveyed; however, these fields were located in 10 of the 14 counties.

These results agree with other recent surveys showing that TSWV occurred generally throughout the peanut production area. These results also indicate that PMV was prevalent in the crop, and that PSV occurred at lesser, but significant, degrees as well. Generally, incidence of all the viruses appeared to be higher than was previously suspected, which indicates that additional study on the importance of these viruses in peanuts in Alabama clearly is warranted.

Gudauskas is Professor, Burch is Research Technician, Jin is Graduate Research Assistant, and Hagan is Associate Professor of Plant Pathology; Weeks is Associate Professor of Entomology.

TABLE 1. VIRUSES IDENTIFIED IN SYMPTOMATIC PEANUT PLANTS BY COUNTY, 1990-91

County	No. fields	No. plants	No. plants infected with			
			PMV	PSV	TSWV	PMV+TSWV
Barbour	12	53	21	0	25	13
Bullock	8	64	32	2	30	23
Butler	6	36	11	0	7	2
Coffee	17	40	18	1	19	10
Conecuh	7	51	22	6	30	9
Covington	10	47	26	1	16	6
Crenshaw	7	35	15	2	17	15
Dale	12	71	15	3	54	14
Escambia	7	41	18	5	29	14
Geneva	16	109	44	8	89	37
Henry	19	143	50	4	98	37
Houston	18	65	22	1	44	21
Pike	12	81	26	7	45	18
Russell	7	55	8	1	26	1

TABLE 2. VIRUSES IDENTIFIED IN SYMPTOMATIC AND ASYMPTOMATIC PEANUT PLANTS

No. plants	Symptoms	Infected with			
		PMV	PSV	TSWV	PMS+TSWV
		Pct.,	*Pct.*	*Pct.*	*Pct.*
1990					
387	+	69.0	5.9	63.8	47.3
155	-	18.7	0.6	20.0	12.3
1991					
504	+	12.1	4.6	56.0	7.3
839	-	14.7	5.2	6.3	0.5

TABLE 3. INCIDENCE OF VIRUSES IN PEANUT FIELDS

Unit	No.	Overall incidence			
		PMV	PSV	TSWV	PMV+TSWV
		Pct.	*Pct.*	*Pct.*	*Pct.*
1990					
Fields	70	91.4	27.1	94.3	85.7
Counties	14	100.0	71.4	100.0	100.0
1991					
Fields	88	59.1	26.1	80.7	29.6
Counties	14	78.6	64.3	100.0	71.4

S.P. SCHMIDT, W.H. GREGORY, AND J.S. BANNON

Urea-Treated High Moisture Milo Useful for Finishing Steers

SORGHUM grain (milo) has been an important feed grain crop in the western part of the Great Plains and the southwestern United States for many years and is becoming more popular in Alabama. Milo grows well in Alabama and is more tolerant than corn of the hot, sometimes dry summer weather. Additionally, research indicates milo is a high quality feed for feedlot cattle when it is harvested at 30% moisture and preserved with urea.

The maximum harvestable yield of milo occurs at a grain moisture content of about 31%, and yields decrease at a rate of 84 lb. per acre for each 1% decrease in grain moisture content. Even if decreased yields associated with field drying were acceptable, field-dried milo often must be mechanically dried to 12% moisture, the recommended maximum moisture content for storing grain safely. Thus, a preservative, drying device, or air-tight facility is necessary for safe storage. Because of a hard seed coat, the milo must be processed (cracked, rolled, or ground) before being fed to livestock.

An Alabama Agricultural Experiment Station study conducted at the E.V. Smith Research Center, Shorter, has shown that urea has the potential to preserve milo harvested at a high moisture content and to improve milo feeding quality. Mixing urea with high moisture grain prior to storage causes the seed coat to crack and soften, prevents the growth of molds, reduces bacterial counts, and makes starch more digestible.

Urea used to treat high moisture milo and the ammonia released during the process are nontoxic to ruminants at the concentrations used to treat high moisture grain. Microorganisms in the stomach of ruminants can use sources of nonprotein nitrogen, such as urea and ammonia, to produce new microbial protein that the animal subsequently can digest and utilize. Thus, urea-treated milo has potential for greater digestibility by cattle, and it may not need to be processed before feeding because of the softened seed coat.

In the study, milo grown at the E. V. Smith Center was either harvested at 30% moisture and mixed with urea at a rate of 3 lb. urea per 100 lb. milo dry matter before being stored in a covered, open bay or field dried to 18-20% moisture followed by mechanical drying prior to storage in a bay. The milo was used in high-grain diets (approximately 75% grain, 15% roughage, plus molasses and minerals) for a steer finishing trial. The urea-treated milo contained 18.8% protein compared to 11.5% protein for the dry milo. The milo had been stored approximately 4 months prior to feeding.

Cracked dry milo was compared to urea-treated, high moisture milo that had either been cracked prior to feeding or left whole. Chopped coastal bermudagrass hay and cottonseed hulls were compared as dietary roughage sources in the diets. The trial lasted 130 days.

Steers fed diets containing cottonseed hulls gained faster and had better feed efficiencies than those fed diets with chopped hay, as shown in the table. Compared to steers fed the dry milo, steers fed urea-treated milo had 9% faster gains and ate almost 5% less feed, producing almost 12% better feed efficiency. Gains and feed efficiency were the same when comparing cracked to whole urea-treated milo, indicating that urea-treated, high-moisture milo may not need to be cracked prior to being fed.

These results are very promising because the cost and time involved with cracking and rolling grain potentially can be eliminated. For comparative purposes, it was calculated that the approximate cost to produce, harvest, and store high moisture, urea-treated milo was $2.87 per bushel, compared to $3.67 for dry milo. This figure does not consider the greater yield of milo when harvesting is done at 30% moisture. If there were no advantages in cattle gains, the greater grain yields and reduced harvesting and storage costs still favor urea treatment of milo harvested at 30% moisture.

Performance of Steers Fed Dry or Urea-Treated Milo with Hay or Cottonseed Hulls as Dietary Roughage Sources

Hay or hulls	Milo-treatment	130-day ADG	Feed intake	Lb. feed/ lb. gain
		Lb.	*Lb./day*	
Hay	Dry, cracked	2.27	29.8[1]	13.1
Hay	Urea-treated, cracked	2.42	28.4	11.7
Hay	Urea-treated, whole	2.43	29.7	12.3
Hulls	Dry, cracked	2.47	30.8	12.4
Hulls	Urea-treated, cracked	2.78	28.5	10.3
Hulls	Urea-treated, whole	2.70	28.7	10.7

[1] Dry basis.

Schmidt is Associate Professor of Animal and Dairy Sciences; Gregory is Superintendent, E.V. Smith Research Center Beef Unit, and Bannon is Director, E.V. Smith Research Center.

K.M TILT, C.H. GILLIAM, J.W. OLIVE, AND E.L. CARDEN

GROW-BAGS EVALUATED FOR SPRING AND SUMMER TRANSPLANTING

LANDSCAPING has become a year-round business, resulting in a demand for plants that can be transplanted during extremely stressful conditions. Research conducted by the Alabama Agricultural Experiment Station indicates the use of grow bags may help meet this demand.

Because harvesting of ornamental trees grown in traditional field production results in 92-98% of the roots being removed, trees from this production method cannot be harvested year-round. Container-grown trees, however, have more confined root growth, resulting in more flexibility for harvesting and transplanting.

Grow-bags, fabric bags that are placed around trees at planting and constrict root growth for easy harvesting, have potential for this use. But these grow bags are not as readily accepted by consumers who prefer plastic containers. To overcome this problem, some nursery producers raise trees in grow-bags and transplant them into plastic containers for retail sales, but limited data are available on this transplanting practice.

A study was conducted comparing tree growth of traditional field production and grow-bag systems in the sandy soils of south Alabama, where traditional field harvesting methods are more difficult. The study also compared performance of trees transplanted from the two production systems to 20-gal. containers in March (dormant trees) and July (actively growing trees).

Small 1-qt. sized plants of live oak and Natchez crape myrtle were transplanted on March 24, 1988. Live oak was selected because of its reputation of being more difficult to transplant, while crape myrtle is a tree that traditionally transplants easily. Trees were planted in a Malbis fine sandy loam soil at the Gulf Coast Substation, Fairhope, in either 18-in. diameter grow bags, which were back filled with native soil, or by direct planting in the field. Cultural practices for weed control, fertilization, irrigation, and pest control were the same for all treatments and plants were spaced 6 ft. within rows and 10 ft. between rows.

Height and caliper data were collected on October 17, 1988, and March 1, 1990. On March 17, 1990, one tree sample from each replication and treatment was randomly selected and harvested. A 20-in. diameter root ball was dug for the traditional field-produced trees, as recommended by the American Standards of Nursery Stock. Grow-bag grown trees were removed from the field in the 18-in. bags. Trees from this sample were cut at ground level and fresh shoot weight determined. Root balls were washed, and the roots were severed and fresh root weight recorded. Two additional trees from each replication and treatment were dug and transplanted into 20-gal. containers filled with pine bark (bags were removed from grow-bag trees).

Trees were fertilized by top dressing with 5.3 oz. per pot of Osmocote (17N-2.6P-10K plus minor elements). Trees were placed under 50% shade for 1 week, then moved to a production area, which was under overhead irrigation.

Grow-bags confine root growth for easy harvesting

On July 11, 1990, 4 months after transplanting, trees were measured for caliper, height, and shoot weight. Root balls were evaluated on the percent of the root ball surface covered with roots. Oak roots were washed and root growth extending into the pine bark from the severed roots of the original root ball were cut and weighed. Crape myrtle root systems were too dense to separate the container medium from the roots, so only root ball ratings were taken.

On the same date (July), the remaining 24 trees from each species and production method were measured, dug, and transplanted from the field into 20-gal. containers using the same procedures described earlier. This was done to evaluate transplanting success during stressful conditions of Alabama's mid-summer heat. These containerized trees were harvested 90 days later and fresh shoot weight and root rating measurements were recorded.

Growth was generally similar with both tree species grown in either traditional field production or grow-bag systems. One exception was 1990 live oak height growth and 1988 caliper growth where trees in traditional field production were 7 in. taller than trees grown in grow-bags and 0.1 in. larger in caliper, respectively. However, this difference was not reflected in the other growth variables, which concurs with most other research on grow-bags.

Neither caliper nor shoot weight of crape myrtles or live oaks differed as a result of transplanting the dormant trees to containers in March, 1990. However, live oaks and crape myrtles produced by traditional methods and grown in containers for 9 months were 16.5 and 6.7 in. taller than trees grown in grow-bags, respectively. Live oak root regeneration measured by the root rating was enhanced when plants were grown in grow-bags, (3.5 for grow-bags, 2.6 for traditional field production).

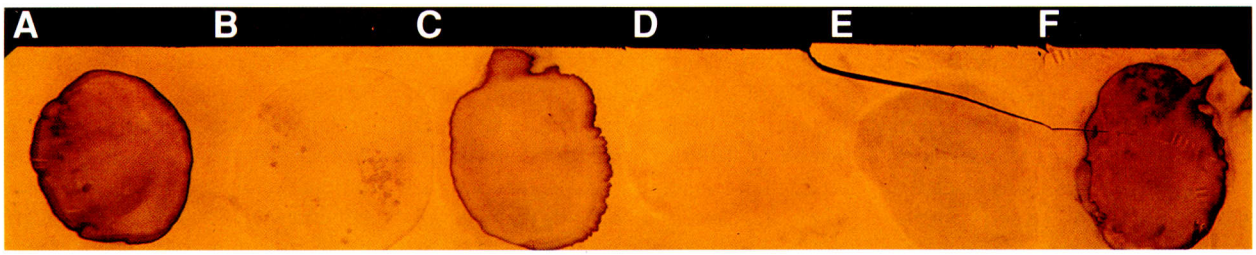
July transplanting of crape myrtles resulted in similar growth to the March transplanting when comparing grow-bag to traditional production. All 24 live oaks produced by traditional field production and transplanted to the 20-gal. containers in July died. Live oaks grown in grow-bags survived and continued to grow until the October harvest.

Though all trees may not benefit from the fabric bag system, this research indicates that some plants can be grown as successfully in grow-bags as by traditional field production methods. Some benefit may be gained in transplanting from grow-bags when using more difficult-to establish trees during stressful periods.

Tilt is Associate Professor and Gilliam is Professor of Horticulture; Olive is Superintendaent of Ornamental Horticulutre Substation; Carden is Superintendent of Gulf Coast Substation.

J.J. GIAMBRONE AND T.L. HATHCOCK

SENSITIVE TEST DEVELOPED FOR IDENTIFICATION OF IBDV IN POULTRY



Tissue print hybridization showing variation in staining intensity among IBDV isolates. A = variant E; B = uninfected control; C = GLS-5; D = S1135 reovirus vaccine; E = Bursine®; F = APHIS.

INFECTIOUS bursal disease (IBD) is an economically important common viral disease of poultry. IBD may cause morbidity or mortality or result in immunosuppression that can make birds more susceptible to infectious disease, reducing vaccine responses. Detecting the virus (IBDV) early allows producers to vaccinate affected and nearby flocks to reduce the spread of the disease. While there are several detection methods already available, these generally require time consuming laboratory analysis and are not rapid enough for use in field detection. The development of a rapid method that is sensitive and specific would be an asset for screening field samples to help control IBDV.

An Alabama Agricultural Experiment Station (AAES) study was conducted to see if molecular hybridization techniques could be useful for this process. Molecular hybridization is the binding of complementary nucleic acid sequences and usually requires the use of a piece of labeled nucleic acid called a probe. Often this probe is radioactive, posing safety problems for field use. The AAES study looked at a nonradioactive probe that could reduce cost of the test and also alleviate some laboratory safety concerns.

Three-week-old chickens were inoculated with IBDV or reovirus. Three pathogenic strains of IBDV were used: one from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS), a serological variant E, and a variant GLS. The commonly used vaccine, Bursine®, also was used. The S1133 reovirus vaccine was used to infect birds as a control because it is commonly given to commercial chickens, contains double-stranded RNA, and replicates in the bursa. Bursae were removed 3 days postinfection. Bursea from each treatment were either prepared for microscopic observation or placed in a buffer and frozen for hybridization.

A probe, made from a single stranded DNA, was prepared and enzymatically labeled with biotin. Bursae were thawed, cut in half, and the cut surface blotted onto a filter. Prehybridization and hybridization processes were then carried out.

After the hybridization was complete, tissue blots (prints) from chickens infected with the three virulent viruses were identified by the rapid appearance of a blue to purple pigment appearing in the tissue impression. In contrast, the Bursine vaccine-infected bursae produced a less intense color change. The bursae from the noninfected and reovirus infected birds produced little to no color.

Results from this process were comparable to microscopic examinations of the bursae, indicating that this process is effective in identifying IBDV infection. This could be a viable alternative for examining large numbers of samples and, when combined with the nonradioactive probe, prints could be examined within 36 hours. The biotinylated probe is simple to prepare, nontoxic, and stable for 12 months when stored frozen.

Because this technique uses unprocessed fresh or frozen bursae, the print can be easily prepared and the tissue frozen indefinitely. In addition, tissue prints can be prepared in advance and stored in the refrigerator for weeks or at room temperature for days. The technique is comparable in time and price to immunofluorescence and peroxidase tests and does not require a microscope. These advantages suggest this technology could help speed up the process of identification of IBDV infections in commercial flocks.

Giambrone is Professor of Poultry Science and Hathcock is Adjunct Instructor of Pathobiology.

ALABAMA AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
AUBURN UNIVERSITY, ALABAMA 36849-5403

Lowell T. Frobish, Director
POSTMASTER-Address Correction Requested

NON-PROFIT ORG.
POSTAGE & FEES PAID
PERMIT NO. 9
AUBURN, ALA.