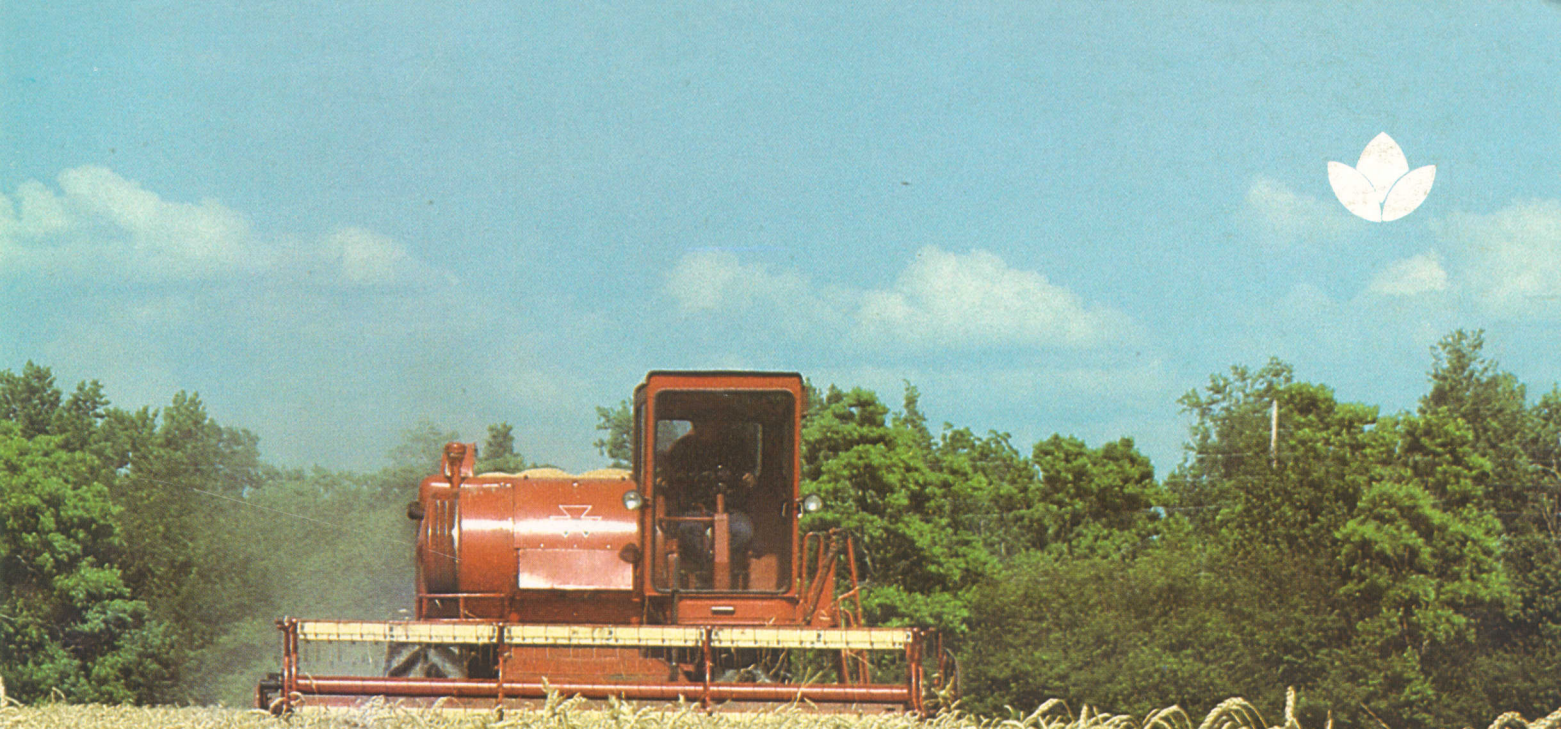


HIGHLIGHTS
of Agricultural Research

Vol. 35, No. 2
Alabama Agricultural Experiment Station
Lowell T. Frobish, Director

Summer 1988
Auburn University
Auburn University, Alabama

Director's Comments

LOWELL T. FROBISH

THE ALABAMA AGRICULTURAL Experiment Station is likely to be in the news in the weeks ahead because of an "Auburn first" in genetic engineering. This first, a transgenic catfish developed in cooperative research with scientists from University of Alabama-Birmingham and Johns-Hopkins University, represents a major accomplishment from Auburn's emerging genetic engineering program that is seeking new and better methods of producing food and fiber.

What makes this catfish unique—and which will likely create nationwide interest—is that it has a human gene (a growth hormone gene) in its genetic makeup. This successful incorporation of a specific gene is the first step in a genetic engineering project that could offer significant improvement in growth rate and efficiency of commercial catfish. The next step requires growing the fish in an experimental pond environment where reproduction can occur to verify that offspring retain the introduced growth gene and to measure growth rate and efficiency.

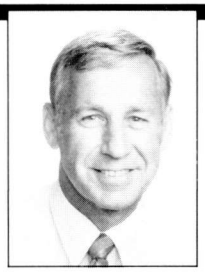
Another first involved is the approval process for introduction of genetically engineered animals into an experimental outdoor environment. An Agricultural Biotechnology Research Advisory Committee (ABRAC) has been established by USDA to help assure the safety of agricultural research involving genetically engineered plants and animals. Auburn's transgenic catfish is the first such animal to be considered by ABRAC in this deliberative process. At this writing, Auburn University is awaiting ABRAC approval for pond testing.

Special pond facilities will be used to protect these valuable research animals and to prevent any possibility of their escaping. In addition to security fences, double screens will be used on pond drains and netting will cover the ponds to prevent bird predation. Every precaution will be taken in handling. If we err it will be on the side of caution.

Although it is much too early to claim great economic value for the transgenic fish, success of the scientific approach and its potential practical value are exciting. Being able to produce a marketable catfish in a shorter time and with less feed input would help the commercial catfish industry take full advantage of its opportunities. Other potential benefits from genetic engineering in catfish could come from incorporating genes for disease resistance and tolerance to such factors as low dissolved oxygen.

Any release of a genetically engineered fish for commercial use is likely to be years away, and will depend on deliberate, painstaking research in the years ahead. Many opportunities exist for advancement through genetic engineering, but caution dictates a slow and deliberate pace to such work.

MAY WE INTRODUCE



Dr. John Plumb, Professor of Fisheries and Allied Aquacultures. A native of Waynesboro, Virginia, Plumb came to Auburn from the U.S. Fish and Wildlife Service where he served for several years as a fish hatchery manager and biologist. He came to Auburn in 1969 as an instructor in fisheries and was promoted to full professor in 1986.

Plumb earned a B.S. degree from Bridgewater College, an M.S. degree from Southern Illinois University, and the Ph.D. from Auburn. Well known to catfish producers in the State, Plumb was presented a Distinguished Service Award by Catfish Farmers of America in 1982 and served for several years as Associate Editor of The Progressive Fish Culturist magazine.

Plumb's research at Auburn deals with viral and bacterial diseases of fish, immunology and vaccination, and environmental interactions with fish diseases. His work on survival rate of bass caught and then released during fishing rodeos is reported on page 4 of this issue of *Highlights.*

ON THE COVER. Wheat following soybeans should be planted as soon as possible after soybean harvest, according to research results reported in the story on page 8.

SUMMER 1988 VOL. 35, No. 2

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Increased Vertical Control Helps Egg Industry and Consumers

H.W. KINNUCAN and A.H. BRAND

VERTICAL CONTROL, the linking of successive marketing or production stages by direct ownership or contracts, is becoming an increasingly important structural characteristic of agricultural markets. Between 1960 and 1980, the portion of U.S. farm output produced under contracts or vertical integration increased from 19% to 30% on a dollar volume basis. Vertical control in some industries, such as sugarcane, seed crops, fluid milk, vegetables for processing, potatoes, citrus fruits, sugar beets, eggs, broilers, and turkeys, is dominant, accounting for over 90% of sales volume.

What are the economic implications of this trend toward increased vertical control in agricultural markets? Do some segments of society benefit at the expense of others, or does increased vertical control have a beneficial impact on all affected parties? Recent research by the Alabama Agricultural Experiment Station, focusing on vertical control in the U.S. egg industry, has begun to answer these questions. The egg industry was chosen for analysis because of its importance to the Alabama agricultural economy (third largest revenue generator in 1986) and the rapid increase in vertical control since 1960, table 1.

Theoretically, economic impacts of vertical control can be linked to the motivations of the firms involved. Two basic motivations can be identified: production efficiency and market power enhancement. A firm (e.g., egg packing plant) that integrates backward in an attempt to stabilize the supply or quality of raw materials or to obtain better information about its price is motivated by efficiency concerns. This type of vertical control, assuming that the cost of internal organization to the firm does not rise appreciably, will result in net cost savings. On the other hand, a firm may integrate forward or backward in an effort to block new entrants into the industry by increasing financing costs, introducing supply risks, and by reducing the size of potential markets for would-be rivals. In this case, the result may be higher costs, especially if there are correlated increases in industry concentration.

Because neither motive for vertical control in the U.S. egg industry can be rejected on theoretical grounds, econometric models were developed to test these two hypotheses. The coordination hypothesis (Model A, table 2) assumes increased vertical control results in reduced marketing costs because of economies achieved through improved coordination of economic activity between vertical exchange points. The concentration hypothesis (Model B) assumes that increased vertical control results in higher marketing costs because of excess plant capacity, higher selling costs, higher profit margins, and other factors associated with enhanced market power.

The econometric models, based on quarterly data for 1972-84, indicated rejection of the concentration hypothesis. In other words, the increased industry concentration associated with vertical control had no discernible effect on egg marketing margins during the period covered by the analysis.

The same models indicated support for the coordination hypothesis. In particular, a significant negative net relationship was observed between vertical control and egg marketing costs (defined as the difference between retail and farm prices for eggs). Specifically, each percentage point increase in the volume of eggs produced under vertical control was estimated to reduce the farm-retail egg margin between 0.17¢ and 0.20¢ per dozen in real terms. Applied to the actual change in vertical control between 1973 and 1983, these estimates indicated a decline in egg marketing costs of between 4.6¢ and 5.3¢ per dozen, table 2. Because real egg marketing margins declined 8.2¢ per dozen over this period, these results suggest that between 56% and 65% of the decline is attributable to vertical control.

Because marketing margins are defined as the difference between retail and farm price, a decline in the marketing margin implies a reduction in retail price, an increase in farm price, or both. The extent to which retail and farm prices adjust to changes in the marketing margin depends on the nature of the demand curve for the retail product and the supply curve for the farm based input. Based on results of past research to indicate the nature of these curves, vertical control reduced retail egg prices an estimated 3.8¢ to 4.3¢ per dozen and increased farm prices 0.77¢ to 1.00¢ per dozen over the 1973-83 period, table 2.

The results of this research suggest that increased vertical control of the egg industry had a favorable impact: middlemen became more efficient and, as a result, consumers paid less for eggs and producers received more.

Kinnucan is Assistant Professor and Brand is a former Graduate Research Assistant of Agricultural Economics and Rural Sociology.

TABLE 1. VERTICAL CONTROL IN THE U.S. EGG INDUSTRY, SELECTED YEARS, 1960-80

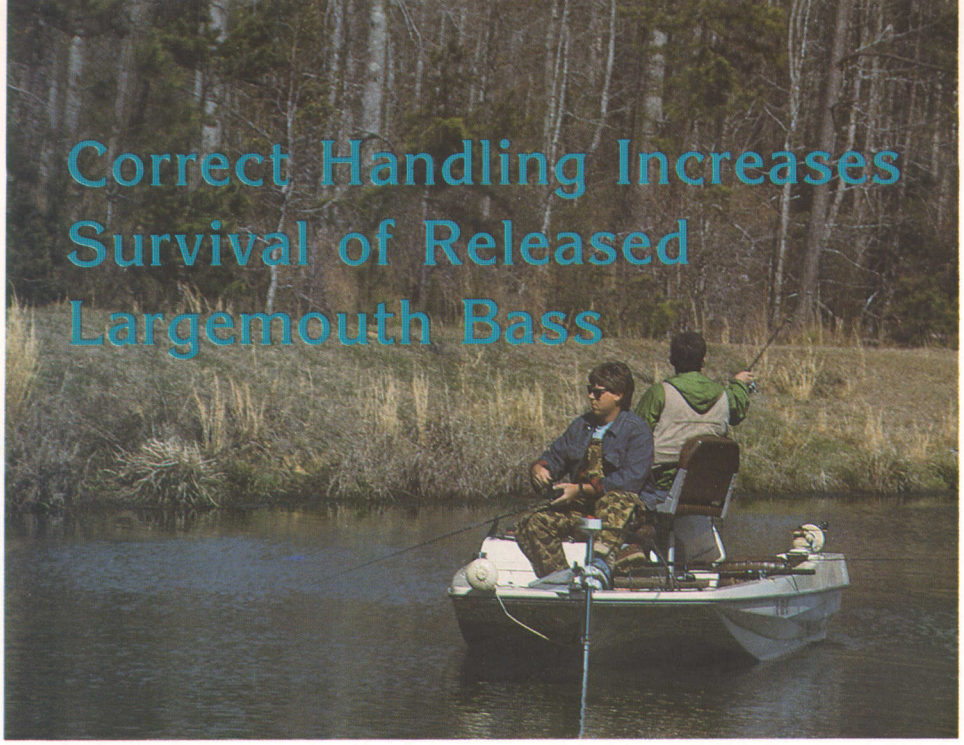
Year	Percent of eggs (dollar volume basis) sold under:		
	Prod. or marketing contracts	Vertical integration	Both
	Pct.	*Pct.*	*Pct.*
1960	5	10	15
1970	20	20	40
1980	52	37	89

Source: R.L. Mighell and W.S. Hoofnagle, USDA, ERS.

TABLE 2. ESTIMATED IMPACTS OF INCREASED VERTICAL CONTROL ON EGG PRICES AND MARKETING MARGINS, 1973-83

Estimation procedure	Estimated effect of increased vertical control on:		
	Retail egg prices/dozen	Farm egg prices/dozen	Farm-retail egg marketing margin/dozen[1]
	Cents	*Cents*	*Cents*
Model A	-4.3	1.00	-5.3
Model B	-3.8	.77	-4.6

[1]The actual marketing margin declined 8.2¢ per dozen between 1973 and 1983.



Correct Handling Increases Survival of Released Largemouth Bass

J.A. PLUMB, J.M. GRIZZLE, and W.A. ROGERS

LARGEMOUTH BASS fishing tournaments have become popular in the Southeast during the past 15 years. Bass that are caught are held in boat live wells until the end of the tournament day, weighed, then released back into the lake. Many of these fish may die within a few days and are not available to other fishermen, causing concern by the public and by state conservation agencies.

To help answer the question of post-tournament survival, a series of "mini-tournaments" was set up on a 14-acre pond on the Fisheries Research Unit of the Alabama Agricultural Experiment Station. Tournaments were held in August, November, February, May, and July to determine the seasonal effects on survival of released bass. Largemouth bass were caught by artificial lures, then either (1) immediately released into a pond environment, (2) held in aerated live wells with a therapeutic additive (water conditioner) for 3 to 9 hours before release, or (3) held in aerated live wells containing only pond water for 3 to 9 hours before release. All fish were marked by fin clipping to identify their treatment and were stocked into ponds for 6 weeks, at which time the fish were harvested and counted to determine survival by treatment.

Total numbers of largemouth bass caught and released in each of the three treatments were: (1) immediate release—90; (2) held in live wells with water conditioner—85; (3) held in live wells without water conditioner—87.

Overall, 99% of largemouth bass that were released immediately survived, see table. This compared to 96% survival for fish held in conditioned water and 91% survival for fish held in nonconditioned water. These data indicate a small but significant increase in survival of fish when a water conditioner was added to live wells.

When comparing the seasonal survival of bass in tournaments, the highest survival of released bass occurred after the February tournament, when 100% of released fish from all treatments were recovered, see table. The next highest survival was after the August tournament, when the only death was one fish in the nonconditioned water treatment. Survival after this tournament may have been influenced by adding cool water to the live wells which reduced the temperature in the wells from 88 °F to 80 °F. Also, rainy, cool weather followed the release of the August fish into the holding ponds, causing pond temperatures to drop to as low as 72 °F 4 days after release, thus having a beneficial effect on the released bass. The lowest survival of released bass occurred after the July tournament, see table. Water temperatures in the live wells were higher during the July tournament than during the other tournaments.

The percentage of fish that died on the day they were caught ranged from 3.6% for August and November to 15.8% for July. There were no mortality differences on the day of the tournament between fish held in the nonconditioned water and those held in water that contained a conditioner.

Lowest post-tournament survival occurred after the May and July tournaments, respectively. The fact that better survival occurred in the November and February tournaments, and especially following the August tournament (when live-well water was artifically cooled), demonstrated the beneficial effects of cool water on survival of fish held in boat live wells for extended periods. Using cool water in live wells, especially during warm weather, would improve the chances of bass surviving while in the wells and after release. However, the differences between live well and lake water temperatures should be less than 8 °F to avoid temperature shock. If ice is used to cool live well water, keeping the ice in a plastic container is necessary to prevent chlorinated water (tapwater) from the ice from harming the fish.

Plumb is Professor, Grizzle is Associate Professor, and Rogers is Professor of Fisheries and Allied Aquacultures.

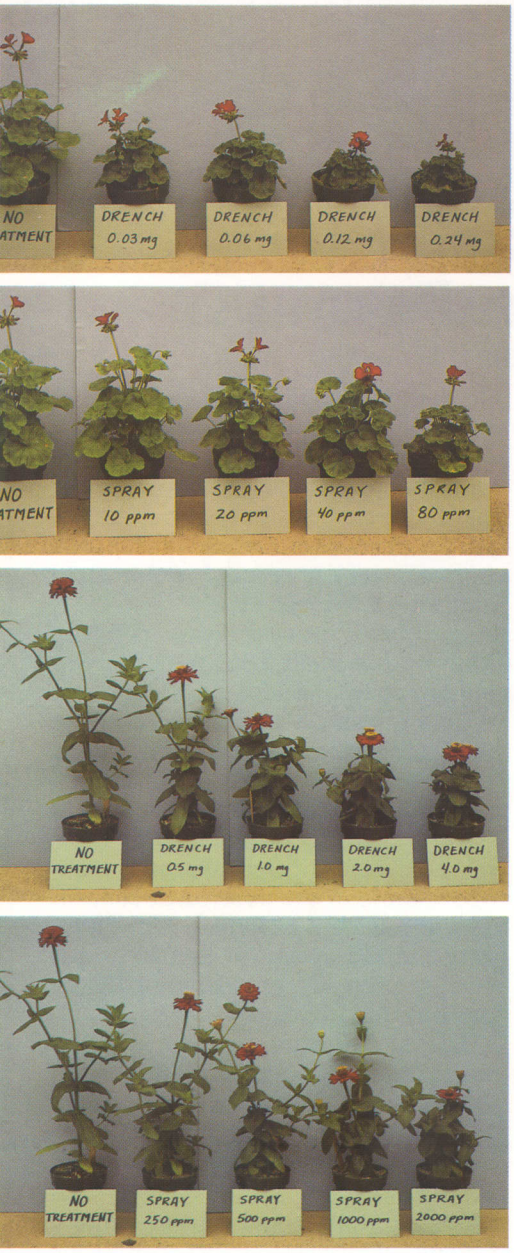
WATER TEMPERATURE AND PERCENT SURVIVAL OF LARGEMOUTH BASS CAUGHT WITH ARTIFICIAL LURES AND RELEASED IMMEDIATELY OR HELD 3 TO 9 HOURS IN CONDITIONED OR NONCONDITIONED WATER

Date of tournament	Pond water temperature	Survival		
		Immediate release	Held in conditioned water	Held in nonconditioned water
		Pct.	*Pct.*	*Pct.*
August 1986	88 °F[1]	100	100	94
November 1986	64 °F	100	94	89
February 1987	52 °F	100	100	100
May 1987	80 °F	100	94	83
July 1987	91 °F	94	93	87
Combined	—	99	96	91

[1]Water in the live wells was reduced to 80 °F with cool well water; immediately following release of bass in holding ponds, a cool front caused a reduction of pond temperature.

New Growth Retardant Successful for Geranium and Zinnia

D.A. COX and
G.J. KEEVER



Paclobutrazol's effects, top to bottom: drench treatment on geranium, spray treatment on geranium, drench treatment on zinnia, spray treatment on zinnia.

COMPACT BEDDING plants are more attractive and are easier to handle and ship. A new chemical, paclobutrazol, has shown powerful growth-retarding effects on geranium and zinnia when applied as a spray or drench. A paclobutrazol-containing retardant (Bonzi^) is labeled for poinsettia but is not currently labeled for use on bedding plants. In studies conducted by the Alabama Agricultural Experiment Station, paclobutrazol was effective in controlling the height of both zinnia and geranium.

Seeds of Smash Hit geranium and Scarlet Ruffles zinnia were direct-sown in 5-in. pots of an amended sphagnum peat moss and perlite medium (1:1 volume). Seedlings were thinned to one per pot. A spray or drench treatment was made to zinnia 22 days after sowing when the plants were about 2.5 in. tall and to geranium 35 days after sowing when the plants were about 1.75 in. tall. Spray and drench rates were chosen based on results of an earlier study.

Spray rates of 10, 20, 40, or 80 p.p.m. and 250, 500, 1,000, or 2,000 p.p.m. were applied to geranium and zinnia, respectively. Drench rates of 0.03, 0.06, 0.12, or 0.24 mg of active ingredient per pot (mg a.i. per pot) and 0.5, 1.0, 2.0, or 4.0 mg a.i. per pot were applied to geranium and zinnia in 1.7 fl. oz. per pot, respectively. (At a drench rate of 0.03 mg a.i. per pot, an ounce of paclobutrazol will treat 945,000 pots.) Plants of both species receiving no treatment were included for comparison. Growth measurements were made 35 days and 40 days after treatment on zinnia and geranium, respectively.

Paclobutrazol sprays and drenches at all rates suppressed plant height and dry weight of geranium compared to plants receiving no treatment. Plant height decreased as the rate of drench or spray increased. Dry weight decreased with increasing spray rate, but not with increasing drench rate. Spray applications of 20 and 40 p.p.m. produced acceptable height reductions without any undesirable dwarfing effects. Drench application of paclobutrazol caused excessive height reduction at all rates tested; internodes were extremely compressed and leaf size greatly reduced.

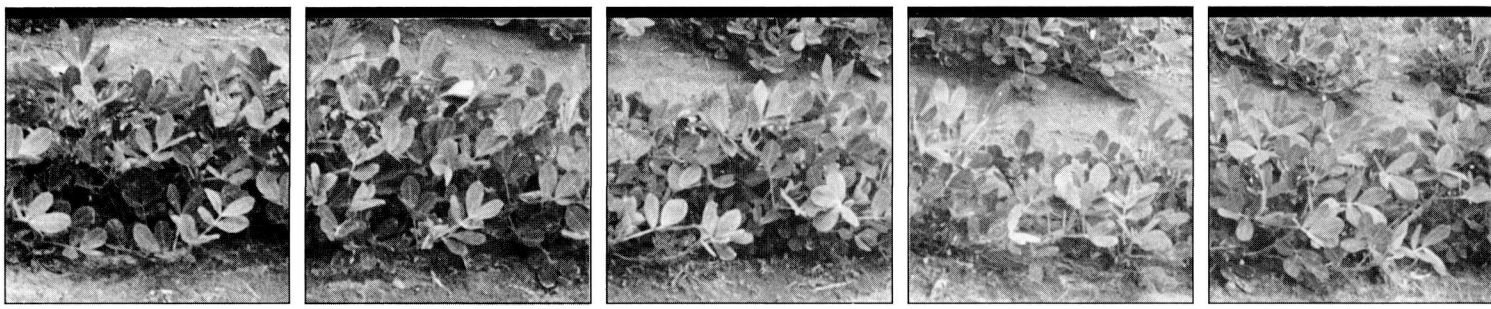
Since all paclobutrazol drench rates tested on geranium resulted in unacceptable retardation in height and leaf size, a second experiment was conducted to determine acceptable drench rates. Smash Hit geranium was grown using the same methods except that treatments were made 40 days after sowing when the plants were about 3 in. tall. Drench rates of 0, 0.00375, 0.0075, 0.015, and 0.03 mg a.i. per pot were applied at 1.7 fl. oz. per pot. Growth measurements were made 45 days after treatment.

Vegetative and flower height, shoot dry weight, and leaf area were suppressed by the lower drench rates applied in this experiment; these retardations became larger with increasing rates. However, only with 0.03 mg a.i. per pot were reductions in height and leaf size considered severe and unacceptable.

As with geranium, paclobutrazol sprays and drenches were effective in reducing plant height and dry weight, but much higher rates were required for zinnia than geranium. As the rate of drench or spray increased, both height and dry weight decreased. Acceptable height reductions resulted from drench applications of 0.5 and 1.0 mg a.i. per pot and spray applications of 250, 500, and 1,000 p.p.m. Height reductions caused by drenches of 2.0 and 4.0 mg a.i. per pot and 2,000 p.p.m. spray were excessive and were accompanied by reduced leaf size and suppressed branch growth.

Results of these experiments demonstrated that acceptable height control was obtained with paclobutrazol when geranium was treated with a single soil drench application of 0.0075 or 0.015 mg a.i. per pot or a foliar spray of 20 or 40 p.p.m. Desirable height was obtained for zinnia with a single soil drench of 0.5 or 1.0 mg a.i. per pot or a foliar spray of 250, 500, or 1,000 p.p.m.

Cox is a former Assistant Professor and Keever is Associate Professor of Horticulture.



Soil Insecticides or Terraclor for White Mold Suppression on Peanuts?

A.K. HAGAN, J.R. WEEKS, and J.A. McGUIRE

WHITE MOLD annually cuts peanut yields statewide by 200-300 lb. per acre, with double or more these losses in severely infected fields. Recent Alabama Agricultural Experiment Station research has shown that the soil insecticide Lorsban 15G® is comparable to the leading fungicide in consistently reducing white mold damage on peanuts. Use of this insecticide has increased on Alabama's peanut crop due to its fungicidal activity against white mold and its insecticidal activity against lesser cornstalker borer, the leading insect pest of dryland peanuts. White mold suppression also has been added recently to the labels of the soil insecticides Mocap 15G® and Dyfonate 10G®.

To determine fungicidal activity of these insecticides and to compare this with the leading white mold fungicide (Terraclor®), Lorsban 15G, Mocap 15G, and Dyfonate 10G were applied at recommended rates 80 to 90 days after planting (about August 1) on a 12-inch band centered over the row. White mold hit counts (one hit = 1 ft. of row with one or more diseased plants) were made after the peanuts were inverted, and the plots were then harvested with a field combine. Results are in the table.

White mold damage, as measured by the number of white mold hits, was clearly reduced in 1985 by the insecticides and Terraclor. Mocap provided superior white mold control and Dyfonate proved to be the least effective. Terraclor had by far the highest yield increase (807 lb. per acre) overall and in each year of the test; however, yield increases were not necessarily associated with reductions in white mold damage. Lorsban and Terraclor yielded 213 and 589 lb. per acre, respectively, more than the nontreated control. Yields in the Mocap and Dyfonate plots were well below those of the nontreated control.

In 1986, fewer white mold hits were found in the treated plots than in the nontreated control. Terraclor, which provided 41% disease control, proved about as effective as the insecticides in reducing white mold damage on peanuts. Disease suppression with the insecticides ranged from a low of 28% with Dyfonate to 46% with Lorsban. Lorsban plots outyielded Dyfonate and Mocap plots by over 200 lb. per acre.

Disease damage was not as great in 1987 as in previous years. Of the three insecticides, Lorsban provided the largest reduction (32%) in white mold hit counts. Terraclor was more effective than Dyfonate and Mocap, but not Lorsban, in suppressing white mold.

White mold suppression in peanuts with the insecticides Lorsban, Mocap, and Dyfonate was clearly demonstrated. Of the three insecticides, Mocap and Lorsban, which reduced white mold damage an average of 40% and 45%, respectively, proved most effective against white mold. Over the 3-year test period, disease incidence was higher in the plots treated with Dyfonate than the other two insecticides, but below that of the nontreated control plots. Despite reductions in white mold damage in all the insecticide-treated plots, only Lorsban consistently increased peanut yields above those of the nontreated control. The average yield increase with Dyfonate and Mocap was 31 and 70 lb. per acre, respectively, compared to 396 lb. per acre for Lorsban.

Use of Terraclor resulted in better white mold suppression and higher yields than the insecticides Lorsban, Mocap, and Dyfonate. Of these, Lorsban had the best combination of disease suppression and yield response. Although Dyfonate and Mocap reduced disease incidence, neither insecticide consistently increased peanut yields. Test results indicate peanut growers are most likely to benefit from Terraclor use in disease-prone irrigated fields with good yield potential. The soil insecticides, however, remain a less costly alternative to Terraclor on dryland peanuts where the risk of soil pest problems is coupled with light to moderate white mold pressure.

WHITE MOLD SUPPRESSION AND YIELD RESPONSE WITH LORSBAN, DYFONATE, MOCAP, AND TERRACLOR ON PEANUTS

Treatment[1]	White mold hits/100 row-ft.				Yield per acre			
	1985	1986	1987	Av.	1985	1986	1987	Av.
	No.	*No.*	*No.*	*No.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Lorsban 15G, 13 lb.	6.5	8.3	5.2	6.7	3,902	3,149	4,084	3,711
Mocap 15G, 20 lb.	4.0	10.0	6.0	7.3	3,314	2,908	3,934	3,385
Dyfonate 10G, 20 lb.	8.1	11.0	7.0	8.8	3,173	2,939	3,927	3,346
Terraclor 10G, 100 lb.	5.8	9.1	4.4	6.4	4,287	3,455	4,340	4,027
Nontreated control	12.1	15.3	7.6	12.2	3,689	2,342	3,914	3,315

[1]All rates in actual product per acre.

Hagan is Extension Plant Pathologist, Weeks is Research-Extension Entomologist, and McGuire is Professor of Research Data Analysis.

Alabama's Current-Use Assessment Reduces Farmers' Land Tax Bill

W.A. FLICK

HOW MUCH MONEY have farmers saved because of current-use assessment? How much have local governments lost? The answers are more variable than one might expect. But on average, current use saved enrolled landowners $1.68 per acre on cropland, 98¢ per acre on pasture land, and 75¢ per acre on timberland. While the landowners gained, county governments lost, on average, about 8.8% of their potential revenue—the revenue they would have had if current use didn't exist.

Current-use assessment was authorized in 1978 and implemented in 1982. Before 1978, only fair market value assessments were allowed. Now, landowners elect current use or continue fair market value assessments.

A current-use estimate of land value is derived from the land's income in its current use. If growing soybeans promised a net income of $50 per acre per year and if interest rates were uniformly 10%, then the current-use value of the land would be $500 (that value, invested at 10%, would pay exactly $50 per year).

A fair market value appraisal is derived from data about sales of comparable properties. If cropland is generally selling for $800 per acre in a county, then it is reasonable to apply that value to comparable tracts.

Current use is naturally controversial. Supporters argue that rising property taxes threaten the viability of farming and forestry in Alabama. Opponents argue that lower taxes for farmers and timberland owners unfairly burden urban landowners and reduce vital county revenues.

To document the effect of the program, the Alabama Agricultural Experiment Station sampled the tax rolls in 20 of the State's 67 counties. The sample had six counties in Standard Metropolitan Statistical Areas (SMSA) and 14 non-SMSA counties. In each county, up to 100 landowners enrolled in current use were selected and, for each landowner, appraisal and millage data for 1982 were copied from county records. Published census data were also used.

AVERAGE TAXES PER ACRE IN DOLLARS, 19 ALABAMA COUNTIES

County	Fair market value			Current use		
	Crop	Pasture	Timber	Crop	Pasture	Timber
	Dol.	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Bullock	2.68	1.76	1.41	1.48	1.37	1.17
Coffee	2.48	1.74	1.12	1.55	1.49	.91
Colbert*	2.90	2.67	1.05	1.06	1.36	.60
Coosa	1.32	1.66	.85	.95	1.24	.73
Dallas	3.37	3.03	1.70	1.63	1.54	.98
Etowah*	2.61	2.20	1.31	1.67	1.56	1.04
Fayette	1.39	—	2.68	1.04	—	1.31
Geneva	3.13	2.34	1.22	1.66	1.63	.92
Houston*	2.65	1.95	1.75	1.05	1.08	.71
Lawrence	2.35	1.76	.95	1.18	1.19	.72
Lee	2.48	2.42	1.60	1.45	1.58	.92
Lowndes	2.13	1.84	1.04	1.48	1.49	.94
Macon	2.48	1.98	1.14	1.40	1.48	.80
Mobile*	11.87	9.86	5.73	2.16	2.35	1.20
Montgomery*	5.14	2.94	1.21	1.16	1.11	.60
Perry	2.22	1.54	1.17	1.41	1.33	1.10
Pickens	1.45	1.44	.80	1.20	1.31	.69
Shelby*	5.21	6.80	3.63	1.73	1.76	.96
Winston	2.48	2.19	1.01	1.42	1.46	.88
Weighted average	3.09	2.38	1.67	1.41	1.40	.02

*Counties designated as SMSA.

The levels of enrollment in 19 counties varied greatly. Washington County had no enrollment, and Coosa's was less than 1% of the agricultural land. In both, current-use assessments exceeded fair market value assessments, so if a landowner enrolled, his taxes increased. In Shelby, Mobile, and Houston counties—all SMSA counties—virtually all of the agricultural land was estimated to be enrolled in current use. In Montgomery, Etowah, and Colbert counties, also SMSA counties, enrollment percentages were estimated to be 74, 45, and 28. On average, an estimated 62% of the agricultural land was enrolled.

Enrollment of timberland also varied. Washington, Perry, Fayette, and Coosa counties all had less than 5% enrolled. Geneva, Houston, Lee, and Montgomery counties all had over 60% enrolled. On average, about 24% of the timberland was in the current-use program.

Why is enrollment so variable? The answer wasn't apparent from the data, so the researchers followed up with a telephone survey of tax assessors. Reasons given on the survey include: (1) people would not enroll if their taxes would increase, (2) some counties actively publicized current use, while others did not, (3) if the penalty for changing land use were large compared to the current-use tax savings, landowners tended not to enroll in the program, and (4) some assessors believe land must be "actively" used to qualify for current use so that current-use taxation of idle agricultural land and natural timber stands might be denied.

Actual tax levels in the sample counties are shown in the table, and the variability is plain. Tax savings to landowners can be computed as the difference between respective columns.

But what about the corresponding loss in tax revenues to local governments? That also varied. In Geneva County, it was estimated to be 27%, while in Washington, Coosa, and Fayette counties, it was estimated to be less than 1%. A weighted average across the counties was 8.8%.

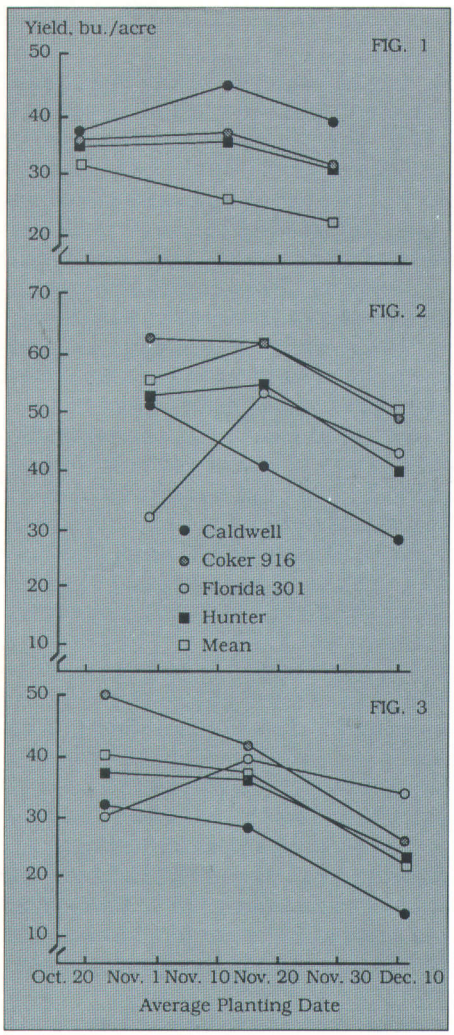
It is important to keep in mind, however, that current use and the second court-ordered reappraisal went into effect in the same year. The reappraisal increased property taxes, and current-use assessment limited the increase on rural lands. So even under current use, the counties received more taxes from rural lands than they did in 1981. They simply did not receive as large an increase as they would have in the absence of current use.

Flick is Associate Professor of Forestry.

Planting Date and Seeding Rate Affect Wheat Yield in Alabama

D.L. THURLOW, W.C. JOHNSON, J.T. EASON, J. K. AKRIDGE, and E.L. CARDEN

DURING THE PAST 20 years wheat acreage in Alabama has increased sharply from a time when little wheat was planted to a peak in 1982 of some 900,000 acres. Most of this increase was caused by double cropping wheat with soybeans and, though acreage has decreased somewhat since 1982, wheat remains an important component in Alabama row crop production. Generally soybeans in Alabama are harvested from October through November, causing planting dates to vary from September for wheat that is not double cropped to mid-December for wheat planted after soybean harvest. The Alabama Agricultural Experiment Station conducted a study to determine the effect of planting date on wheat yield and if planting date would dictate which variety should be planted.



Average wheat yield by variety and planting date: FIG. 1—1985-86, Crossville; FIG. 2—1984-86, Monroeville; FIG. 3—1984-86, Fairhope.

These studies were performed at the Sand Mountain Substation in Crossville; Monroeville Experiment Field in Monroeville; and Gulf Coast Substation in Fairhope. Planting dates were late October, mid-November, and early December. Two seeding rates (60 and 90 lb. per acre) were also compared at one location. Three to nine varieties were used at each location, though only three or four are shown in the figures to illustrate how yield was affected by planting dates. Caldwell, Coker 916, and Hunter were grown at all locations each year and Florida 301 was included at Monroeville and Fairhope each year.

The effect of planting date on yield of wheat in northern Alabama (Crossville) varied among the varieties, figure 1. Grain yields of Caldwell and Coker 916 were similar when planted in either October or mid-November, but decreased when planted later. However, the yield of Hunter dropped dramatically with each delay in planting. Yield with the 90-lb.-per-acre seeding rate was higher than with the 60-lb. rate for all varieties and planting dates (34.6 vs. 28.9 bu. per acre).

At Monroeville, in southern Alabama, variety and planting date displayed strong influences on yield. Results indicate that Coker 916 can be planted in late October or mid-November with equal success, figure 2. However, grain yield of Caldwell decreased when planted after late October. Hunter and Florida 301 showed highest yields when planted in mid-November. Florida 301 had its lowest yield when planted in late October.

At Fairhope, near the Gulf Coast, Caldwell and Hunter responded similarly to planting dates, figure 3. For both varieties, yields were decreased only when planting was delayed to mid-December. Coker 916 had the highest yield with the mid-October planting and yield decreased with each delay in planting. Florida 301 performed similarly at Fairhope as it had at Monroeville, displaying the highest yield with the mid-November planting and the lowest yield with the early planting date.

In summary, it appears that when wheat is planted mid-October or later, the seeding rate should be 90 lb. per acre. The optimum planting date of wheat for grain depends on variety, but generally in northern Alabama is late October and in southern Alabama mid-November. In southern Alabama, varieties such as Caldwell need to be planted earlier than mid-November and others such as Florida 301 should not be planted until mid-November or later. Except for Florida 301 in southern Alabama, results of these tests indicate that wheat should be planted as soon as conditions permit after soybean harvest.

Thurlow is Associate Professor and Johnson is Professor of Agronomy and Soils, Eason is Superintendent of the Sand Mountain Substation, Akridge is Superintendent of Monroeville Experiment Field, and Carden is Superintendent of Gulf Coast Substation.

Wife's Off-Farm Employment Affects Marital Relationships

C.W. SMITH

TODAY'S WOMAN is confronted with the challenge of combining the role of homemaker with a career or occupation outside of the home. For farm women, the challenge is even greater. They are not only confronted with the demand of combining the roles of homemaker and career woman (her career being the farm), but the majority must face the additional demand of employment off the farm.

Since stress from off-the-farm employment would be expected to affect family relationships, this is one area being investigated in a Southwide study on quality of life of farm families. The Alabama Agricultural Experiment Station portion of the study is seeking an understanding of stressors and the factors which influence how farm families are able to cope with the rapidly changing economic and social conditions.

One part of this project focused on the marital relationship and how various factors influence the degree of adjustment or satisfaction that couples have in their marriages. Information about this topic came from questionnaires completed by 111 Alabama farm families.

In addition to answering demographic questions, the couples completed a rating known as the Dyadic Adjustment Scale (DAS). This scale provides an overall measure of marital adjustment and measures of consensus, cohesion, satisfaction, and affective expression. In general, scores below 90 indicate severe marital conflict, scores of 90-110 indicate dissatisfaction, and scores above 110 indicate satisfaction. How this rating is affected by the wife's off-farm employment is indicated by scores in the table for different type farm families.

In general, farm couples who had been married longer and had "launched" their children out of the nest were more satisfied with their relationships. This is not surprising since in most marriages the critical period of adjustment is the first 3-7 years of marriage. After that time, most people have adjusted to the relationship or have divorced. However, there were some specific factors which influenced the degree of satisfaction felt by farm couples.

The most consistent effect found for farm couples of all ages was whether the wife was employed off the farm. The mean DAS scores for couples in which the wife was employed off the farm versus not employed off the farm were 108.6 and 117.0, respectively. In this sample, couples reported much greater satisfaction in their marriages, in all respects and for all ages, when the wife was not working.

The triple-threat situation of off-farm employment, farm work, and homemaking impacts on overall life satisfaction as well as the marital relationship. In these situations the persons involved feel they are not fulfilling any of their roles well. They report feelings of less intimacy in their marriages, less cohesion or togetherness and sense of "family," and a lessened ability to deal with problems confronting them.

MARITAL ADJUSTMENT AND SATISFACTION OF ALABAMA FARM COUPLES AS RELATED TO WIFE'S OFF-THE-FARM EMPLOYMENT AND OTHER CHARACTERISTICS[1]

Characteristics of wife	DAS score[2]
Employed off farm	108.6
Not employed off farm	117.0
Childbearing and childrearing stage	107.3
Launched stage	114.3
College graduate	108.5
High school graduate	115.7
Less than high school education	111.3

[1]Data from 111 couples who completed questionnaire.
[2]Scoring scale: below 90 indicates severe marital conflict; 90-110 indicates dissatisfaction; and above 110 indicates satisfaction.

The educational level of farm wives also influenced the marital relationship. Those marriages in which the wife had some college education or a college degree were less adjusted than high school graduates or women with less than a high school education (DAS scores of 108.5, 115.7, and 111.3, respectively). This was particularly the case in young farm families, as noted by data in the table.

The young farm wife, who is in the childbearing and rearing stage of the family life cycle, is more likely than her older counterpart to have some college education, and she also has the responsibility of rearing young children. She has had less experience in dealing with the rigors of marriage, the tumult of child-rearing, and the unpredictability of farm economics. Thus, the young farm wife is most likely to have assumed the demands of a number of roles and she is the one who is least likely to have the experience to cope with all of them. In a situation such as this, it is the marital relationship that is likely to suffer.

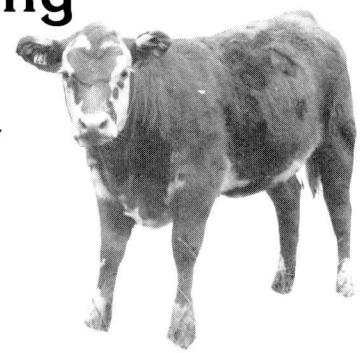
College-educated wives working off the farm also must deal with the fact that employment opportunities in rural areas are typically not those that a college-educated woman would find satisfying. This helps explain the study results which indicate that these women are indeed less satisfied with their work and families.

While some of these findings may appear discouraging, the picture is not bleak. In general, farm couples are no more dissatisfied with their marriages than are couples in the general population. Furthermore, the average scores of the surveyed couples were not indicative of severe conflict.

Finding solutions to the problem is not easy, but there are obvious areas to be considered. Such approaches as sharing homemaking duties between husband and wife and making a conscious effort to nurture the marital relationship offer opportunities for progress.

Smith is Assistant Professor of Family and Child Development.

Feedlot Finishing After Weaning Best for Heavy Beef Calves



S.P. SCHMIDT, T.B. PATTERSON, H.W. GRIMES, J.L. HOLLIMAN, and L.A. SMITH

QUESTION: What is the best finishing system for beef calves that weigh more than 600 lb. at weaning?

ANSWER: Put directly into feedlot and feed to slaughter finish.

That was the conclusion from results of a post-weaning performance comparison of crossbred calves done by the Alabama Agricultural Experiment Station. Heavy calves made more economical gains when placed in a feedlot at weaning than when grown out on pasture before finishing.

Another major finding was the difference in performance by calves because of breed of sire or dam. These results support the general understanding that cattle with exotic breeding take longer than those of British breeding to reach the same degree of finish. The exotics grow faster, but are larger at finish and mature later.

Two management systems for taking calves from weaning to slaughter were evaluated in the study at the Black Belt Substation, Marion Junction:

1. Placed in a feedlot and full-fed a high-corn diet until they reached backfat thickness of 0.45-0.55 in. (average of 179 days).

2. Kept on pasture of fungus-free fescue until fescue began summer dormancy about June 1 (average of 267 days on pasture); then placed in feedlot and fed to same backfat thickness (an average of 127 days). During winter on pasture, calves were fed hay and 12% protein concentrate for an average of 60 days when pasture was inadequate.

Comparing performance between the two systems, without regard to breed of calf, reveals four major points: Calves that went directly to the feedlot after weaning (1) were 180 lb. lighter when they reached slaughter finish, (2) were 213 days younger at slaughter, (3) gained almost 1 lb. per day more from weaning to finish, and (4) had a higher percentage that graded Choice at the same degree of finish than those that grazed before going to the feedlot.

Several breed differences also showed up in the comparisons, beginning with weight at weaning. Calves out of Simmental-Hereford cows were 39 lb. heavier at weaning than those from Angus-Hereford cows (664 vs. 625 lb.). However, breed of sire (Polled Hereford or Charolais) did not affect weaning weight.

Results with the pasture plus feedlot finishing system reported in the table can be summarized as follows:

- While grazing, calves sired by Charolais bulls gained faster than those by Polled Hereford bulls; however, the opposite was true in the feedlot.
- Calves with Charolais or Simmental breeding took 15 to 17 days longer to reach the desired backfat thickness than those with predominantly Angus or Hereford breeding.
- A higher percentage of Charolais-sired calves graded Choice than Polled Hereford-sired calves.

Results were different among the calves that went directly to the feedlot at weaning, as indicated by the following findings:

- Calves out of Angus-Hereford cows gained faster than offspring of Simmental-Hereford cows and finished in 6 fewer days.
- Charolais-sired calves gained faster but took 11 days longer to finish than calves sired by Polled Hereford bulls.
- Unlike calves that grazed prior to feedlot finishing, these animals showed no differences in carcass grades or percent grading Choice as a result of sire breed (fed to same backfat thickness).

Looking at the results from an economic standpoint, there was a savings in feed and pasture costs by putting weaned calves directly into the feedlot. This difference amounted to about $10 per hundredweight gain.

Other potential advantages from the direct feedlot finishing systems are (1) carcass prices are usually higher in winter when the direct-feedlot group finishes, and (2) a greater proportion of the direct-feedlot carcasses graded Choice.

POSTWEANING PERFORMANCE OF CROSSBRED CALVES PUT DIRECTLY INTO FEEDLOT AFTER WEANING OR PUT ON PASTURE FOLLOWED BY FEEDLOT FINISHING

Breed of calves	Weight into feedlot	Finish weight	Av. daily gain		Gain in feedlot	Age at slaughter	Percent Choice
			Grazing	Feedlot			
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Days*	*Pct.*
DIRECTLY TO FEEDLOT AT WEANING							
Average by breed of dam							
Angus x Hereford	644	1,093	—	2.57	453	446	60
Simmental x Hereford	685	1,129	—	2.44	443	453	54
Average by breed of sire							
Charolais	674	1,141	—	2.53	468	455	58
Polled Hereford	656	1,082	—	2.48	428	444	56
GRAZED THEN TO FEEDLOT							
Average by breed of dam							
Angus x Hereford	972	1,268	1.28	2.47	294	658	28
Simmental x Hereford	988	1,312	1.24	2.47	330	668	39
Average by breed of sire							
Charolais	992	1,310	1.32	2.38	321	672	49
Polled Hereford	968	1,271	1.20	2.56	304	654	18

Schmidt is Associate Professor and Patterson is Professor Emeritus of Animal and Dairy Sciences; Grimes is Superintendent, Holliman is Associate Superintendent, and Smith is Superintendent (retired) of the Black Belt Substation.

Matching Breed to Gestation Facilities Results in Top Sow Performance

D.L. KUHLERS, S.B. JUNGST, J.A. LITTLE, and M.R. DUFFLE

THE COST OF purchasing or raising replacement gilts and the lower productivity of gilts compared to sows make longevity and lifetime production important economic factors in commercial swine operations. Since both breed of animal and type of gestation facility used can influence sow performance, the Alabama Agricultural Experiment Station conducted a study to evaluate longevity and lifetime production of three types of crossbred sows in two types of gestation facilities.

A total of 256 sows was used in the study, with approximately equal numbers of Duroc-Landrace, Hampshire-Landrace, and Yorkshire-Landrace crosses being studied. Half of each crossbreed group was maintained on bahia pasture lots during gestation, while the other half was housed in 2-ft. by 7-ft. gestation stalls. The sows were evaluated on (1) what percentage of each study group produced four litters of pigs (the national average), and (2) the total number and pounds of pigs produced at 21 days after having the opportunity of farrowing four litters. Detailed results are given in the table.

A greater percentage of Hampshire-Landrace sows (87%) completed four litters than Duroc-Landrace sows (78%), with only 70% of the Yorkshire-Landrace sows farrowing four litters. More Hampshire-Landrace and Duroc-Landrace sows in the pasture gestation system farrowed four litters than Yorkshire-Landrace sows. Hampshire-Landrace sows also performed better than Duroc-Landrace or Yorkshire-Landrace sows in the confinement gestation system.

Evaluation of total pig numbers and weights revealed that Hampshire-Landrace sows generally outperformed the other two breed crosses. When comparing the breed groups regardless of the type of gestation facility used, Hampshire-Landrace sows produced 2 to 5 more pigs and 19 to 72 more pounds of pigs after farrowing four litters than Duroc-Landrace or Yorkshire-Landrace crosses. Little difference was seen in performance between the pasture and confinement systems when averaged across the three sow crosses. However, comparing the three crosses within the pasture gestation system, Duroc-Landrace and Hampshire-Landrace sows raised a total of 6 to 8 additional pigs to 21 days in four farrowings than Yorkshire-Landrace sows. Total pounds of pigs produced in four litters varied little between the breed groups in confinement gestation, but Hampshire-Landrace sows did produce 60 to 70 more total pounds of pigs at 21 days than the other two groups.

Interestingly, Yorkshire-Landrace sows produced more total pigs and pounds of pigs when housed in confinement facilities, while Duroc-Landrace sows were more productive on a pasture gestation system. This may be attributed to the traditional selection history of breeding Durocs as pasture animals and Yorkshires as a confinement breed.

Results from this study indicate that a commercial swine producer should match his sow breeds with the type of facility on the farm. Farmers with a pasture gestation system should consider using Hampshire-Landrace or Duroc-Landrace sows, while farmers with confinement systems may want to use the Hampshire-Landrace cross. The Yorkshire-Landrace cross may be the least economical choice for either system.

SOW PERFORMANCE BY BREED AND TYPE GESTATION SYSTEM

Sow breed and gestation system	Sows completing four litters	Total 21-day litter production	
		Litter size (pigs)	Weight
	Pct.	*No.*	*Lb.*
Crossbred sow			
Hampshire-Landrace	87	32	367
Duroc-Landrace	78	30	348
Yorkshire-Landrace	70	27	295
Gestation system			
Pasture	81	30	333
Gestation stalls	76	30	341
Crossbred sow x gestation system			
Hampshire-Landrace x pasture	86	31	351
Duroc-Landrace x pasture	85	33	372
Yorkshire-Landrace x pasture	71	25	275
Hampshire-Landrace x gestation stalls	88	33	383
Duroc-Landrace x gestation stalls	71	28	323
Yorkshire-Landrace x gestation stalls	70	29	315

Kuhlers is Professor and Jungst is a Research Associate of Animal and Dairy Sciences; Little is Superintendent and Duffle is herdsman of the Lower Coastal Plain Substation.

Herbicides O.K. for Turfgrass With Harvesting Delay After Application

S. SHARPE, R. DICKENS, and D.L. TURNER

SODGRASS PRODUCERS rely heavily on herbicides to control weeds that can slow development and reduce quality of turfgrasses. Unfortunately, the effects of many of these herbicides on tensile strength and rooting ability of the grasses are not known. Tensile strength, which determines resistance of sod to breaking apart, is important in sod harvesting and handling during installation, and rooting ability is an important quality factor in success of establishing new plantings.

A study by the Alabama Agricultural Experiment Station measured the effects of the 25 herbicide treatments listed in the table. The experiments were conducted during the 1986 and 1987 growing seasons at a Lee County sod farm.

The herbicides were applied in May to sods of bermudagrass, centipedegrass, and zoysiagrass as spray applications. Mature turfs were used in 1986 and immature turfs in 1987. Herbicides tested included several experimental materials showing promise for use on warm season grasses, along with most of the herbicides currently registered for use. Measurements of tensile strength and rooting were made at 2, 4, and 8 weeks after application. Results at 4 weeks in the bermudagrass plots are reported in the table as an example of the herbicide effects.

Tensile strength of mature sods was not affected by any of the treatments. Immature centipedegrass treated with Arsenal® or Devrinol® had reduced tensile strength, but the other species were not affected.

Both root density and root length were greatly influenced by herbicide treatments even in the absence of any effects on tensile strength. In general, the effects were more severe on the more immature sod used in 1987. Arsenal, the most injurious herbicide tested, caused significant injury at all rates to all of the grasses. Devrinol and Presan® also reduced root growth of all grasses; in some cases the effects lasted for 8 weeks after treatment.

High rates of Oust® caused significant reductions in both root length and root numbers to bermudagrass and zoysiagrass, while the lower rate stimulated increases in root numbers of zoysiagrass 4 to 8 weeks after applications. Oust reduced root production in centipedegrass at the two higher rates, but had no effect on root numbers after 2 weeks. Poast® reduced rooting in zoysiagrass and bermuda-grass, but had no effect on centipedegrass. Pre-M® did not reduce rooting of mature sods, but caused some initial reduction in rooting of immature centipedegrass. Image® generally caused no rooting problems with any of the grasses. Ronstar® caused some initial root injury to all the grasses, however, the effects dissipated by the end of 4 weeks.

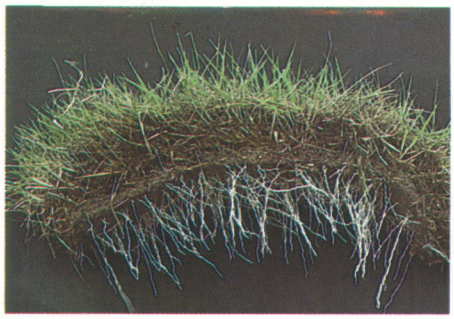
Results of this study indicate that if sod is not to be harvested sooner than 8 weeks after treatment, most any of the currently registered herbicides can be applied without affecting either sod tensile strength or subsequent rooting.

Sharpe is Research Assistant, Dickens is Professor, and Turner is Research Associate of Agronomy and Soils.

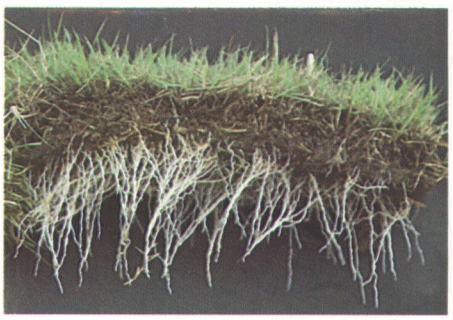
EFFECT OF HERBICIDE TREATMENTS TO BERMUDAGRASS AT 4 WEEKS, 1986 AND 1987

Herbicides and lb. a.i./acre	Injury		Sod strength		Roots/sq. ft.		Root length	
	1986	1987	1986	1987	1986	1987	1986	1987
	Pct.	*Pct.*	*Lb./ft.*	*Lb./ft.*	*No.*	*No.*	*In.*	*In.*
Aatrex, 2.0	0	60	67	39	225	385	4	4
Aatrex, 3.0	0	75	73	47	275	244	3	4
Arsenal, 0.06	82	37	—	46	—	19	—	1
Arsenal, 0.11	95	36	62	45	—	65	—	1
Arsenal, 0.22	82	42	71	36	—	—	—	—
Dacthal, 12.0	0	2	75	45	281	232	4	4
Devrinol, 2.0	2	5	73	49	49	128	2	2
Devrinol, 4.0	0	6	75	38	19	49	1	1
Harmony, 0.03	2	12	75	45	294	311	5	4
Harmony, 0.06	0	6	87	47	287	373	4	4
Image, 0.25	2	12	76	44	263	202	3	3
Image, 0.37	2	12	56	44	422	92	4	2
Image, 0.50	0	18	82	36	294	220	3	3
Oust, 0.01	0	13	68	45	147	354	3	4
Oust, 0.03	2	24	79	49	49	202	1	3
Oust, 0.06	0	31	61	41	73	116	9	2
Poast, 0.25	23	81	66	35	195	67	3	2
Poast, 0.50	58	82	54	42	98	7	2	1
Pre-M, 1.5	0	1	77	46	348	299	4	3
Pre-M, 3.0	5	2	68	42	336	299	4	4
Presan, 12.0	0	18	71	43	24	116	1	3
Princep, 2.0	0	5	66	37	196	281	3	4
Princep, 3.0	0	11	62	41	232	147	2	3
Ronstar, 2.0	0	63	70	35	268	220	4	3
Ronstar, 4.0	5	87	78	41	287	36	4	2

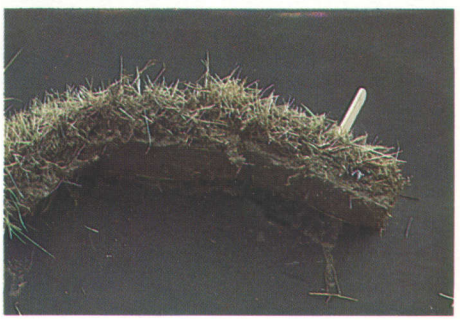
Zoysiagrass, no herbicidal treatment.



Zoysiagrass with 0.5 lb. a.i./acre Poast.



Zoysiagrass with 0.22 lb. a.i./acre Arsenal.



Insecticides Vary in Effects on Red Imported Fire Ant

A.G. APPEL, P.P. COBB, and R.R. BEAUCHAMP

THE RED IMPORTED fire ant is one of the most important insect pests in the Southeastern United States. The ants have become increasingly abundant around homes and in maintained turf. Their bites and stings, as well as the mounds they build, have caused problems for farmers and homeowners alike. Not only are they a hazard in home lawns and recreational turf (particularly to children), but there have been numerous reports of these ants invading homes.

There are two general types of treatments for controlling fire ants with insecticides: area-wide broadcast and individual mound treatment. Since most homeowners in Alabama encounter only a few mounds on their property, the Alabama Agricultural Experiment Station in cooperation with the Alabama Cooperative Extension Service evaluated various insecticides for red imported fire ant mound treatment.

Well defined mounds on maintained turf baseball diamonds in Wetumpka were selected for the tests. The insecticides tested for effectiveness were: corn cob grit based formulations GX-071 A and B, Affirm® , Amdro® , and Logic® and non-nutrient formulations of Diazinon® granules and Orthene® wettable powder. The two GX-071 formulations are experimental and have not yet been labeled for fire ant use. All other compounds used are labeled for use on fire ants. Suggested label rates were applied. When two rates were recommended, the lower rate was used. Each treatment was applied to 20 mounds and untreated control mounds were used to compare the insecticides' effectiveness against natural mortality.

The compounds were evaluated for effectiveness, speed of action, ease of use, and odor. All mounds were visited 1, 2, 3, and 6 weeks after treatment and evaluated for mortality and relocation.

EFFECTIVENESS OF RED IMPORTED FIRE ANT MOUND TREATMENTS IN RECREATIONAL TURF

Treatment	Control, by week				
	1	2	3	6	Total[1]
Diazinon	5.0	5.0	5.0	4.8	4.95
Orthene	5.0	5.0	5.0	4.4	4.85
Amdro	3.0	2.9	2.4	2.3	2.65
GX-071A	2.2	2.3	2.2	3.2	2.48
GX-071B	1.7	1.3	2.7	3.2	2.23
Affirm	1.8	2.6	2.3	2.1	2.20
Logic	.9	.9	1.1	1.2	1.03
Untreated	.0	.0	.0	.2	.05

[1]Total averaged over all four visits; 0 = no control, 5 = total control.

Colonies were rated from 0 (no effect) to 5 (complete kill) and a 3-ft. radius around the treated mounds was examined for signs of colony relocation.

Both of the GX-071 formulations, as well as Affirm, Amdro, and Logic, were odorless and easy to apply. Diazinon had an unpleasant odor and was more difficult to apply than the corn cob base baits, probably because of the smaller size of the particles. Orthene's odor was strong and this insecticide was the most difficult to work with because it was easily blown by wind and adhered readily to clothing.

Diazinon and Orthene killed the ants more effectively and rapidly than the other treatments, as reported in the table, but also induced more mound relocations. The GX-071 formulations, Affirm, and Amdro performed similarly. These corn cob base baits, however, took longer to kill mound populations than the non-nutrient formulations. There were fewer relocations with these baits than with Diazinon or Orthene and at 6 weeks there was no difference in control between the GX-071 formulations and the two non-nutrient formulations. Of the corn cob base compounds, Logic performed the poorest. There was essentially no mortality in the control mounds.

In conclusion, Diazinon and Orthene mound treatments worked faster than the other products but were more likely to induce mound relocation. The corn cob base baits, except Logic, performed similarly at 1, 2, and 3 weeks, while the GX-071 formulas performed as well as Diazinon and Orthene at 6 weeks. These results suggest a dual approach to treatment using the slower-acting baits as early season broadcast treatments to prevent the establishment of new mounds and the fast-acting formulations to quickly kill populations in existing mounds.

Appel is Assistant Professor of Entomology, Cobb is Extension Entomologist, and Beauchamp is Associate County Agent.

Greenhouse and nursery sales had large increases during 1976-86.

Many Commodities Contribute to Alabama's Cash Farm Receipts

J.H. YEAGER

ALABAMA'S CASH FARM receipts have about tripled in the past 20 years. At the same time, there have been major shifts in income from specific commodities. Certain livestock, livestock products, and crops appear to be on an upward trend, while some show little change. In other cases, data accumulated by the Alabama Agricultural Experiment Station show substantial declines in receipts.

Broilers continue to be the single most important source of Alabama's cash farm receipts. As noted in the table, cash receipts from broilers more than doubled from 1966 to 1976 and doubled again from 1976 to 1986. Broilers accounted for more than 20¢ out of each dollar of total cash farm receipts (excluding government payments) in 1966 and 1976, but jumped to 37¢ in 1986.

The second single most important source of Alabama cash farm receipts is cattle and calves. Receipts more than doubled from 1966 to 1976, but fell far short of doubling from 1976 to 1986. Combining receipts from cattle and calves with those from broilers accounted for more than 53% of the State's total cash farm receipts in 1986.

A substantial increase in cash receipts from eggs occurred from 1966 to 1976, but growth was much less rapid from 1976 to 1986. Sale of dairy products increased only about 5% from 1976 to 1986, while receipts from hogs declined substantially.

Among crops, the major producer of cash receipts in 1986 was peanuts, followed rather closely by greenhouse and nursery products. A major increase in greenhouse and nursery sales occurred between 1976 and 1986, when cash receipts more than tripled.

Forestry is a major contributor to cash receipts. Receipts from farm forestry products more than doubled from 1976 to 1986, while receipts from nonfarm commercial timber in 1986 were 2.4 times higher than in 1976.

Cash receipts from corn, cotton, and soybeans showed major declines from 1976 to 1986. Corn had both a substantially lower acreage harvested and lower total production and price in 1986 than in 1976. At the same time, average yield per acre decreased from 62 bu. to 57 bu. The decline in cotton cash receipts resulted from both lower acreage and lower price received. An average yield of more than a bale of cotton per acre in 1986 helped offset some of the decline in cash receipts that would have otherwise occurred. The drop in soybean cash receipts resulted from a precipitous decline in both acreage and price, but there was little change in average yield per acre.

Cash farm receipts from wheat showed substantial increases over the 20-year period. Potato cash receipts declined from 1976 to 1986, while sweet potatoes showed increased receipts for the 20 years. Receipts from sales of other vegetables also increased.

Total cash farm receipts from livestock and crops increased 149% from 1966 to 1976, but only 29% from 1976 to 1986. These changes reflect the fact that average prices received by Alabama farmers almost doubled from 1966 to 1976 but increased only 21% from 1976 to 1986. The proportion of cash receipts accounted for by livestock and crops did not change greatly during the 20 years (two-thirds for livestock and livestock products and one-third for crops).

Growth in Alabama's livestock sector, and in particular broilers, has had its effect on the input side. The amount spent by farmers for feed increased from slightly over $159 million in 1966 to $436 million in 1986.

Among all 50 states, Alabama ranked 26th in total cash farm receipts in 1986. The ranking for livestock and livestock products cash receipts was 21st, while that for crops was 30th. For individual products, Alabama ranked 3rd in broilers and peanuts and 8th in eggs and cotton. The leading state in cash receipts in 1986 was California with more than $14 billion. Alabama continnues to be a diversified state in farm products produced and the potential exists for further growth in cash farm receipts.

Yeager is Professor and Head of Agricultural Economics and Rural Sociology.

CASH FARM RECEIPTS, ALABAMA[1]

Source of income	Mil. dol., by year		
	1966	1976	1986
Livestock and products			
Cattle, calves	121.2	309.8	329.0
Hogs	44.5	96.8	49.6
Dairy products	42.5	72.2	75.5
Broilers	161.1	346.9	775.6
Eggs	84.3	154.1	161.6
Other poultry	10.6	7.1	6.3
Miscellaneous	.8	6.4	33.3
Total	465.0	993.2	1,430.8
Crops			
Wheat	2.2	7.5	15.5
Corn	13.5	51.2	19.5
Oats	.3	.6	.5
Hay	3.0	8.6	7.7
Sorghum grain	.1	.8	4.5
Cotton lint	52.4	115.0	71.3
Cottonseed	11.1	12.3	6.1
Peanuts	24.9	104.2	126.2
Soybeans	18.6	181.1	85.3
Potatoes	4.2	21.2	12.1
Sweet potatoes	1.4	3.8	9.7
Other vegetables	13.4	32.7	55.0
Pecans	8.7	3.3	11.4
Peaches	2.0	2.0	1.6
Other fruit	.6	.6	6.5
Greenhouse, nursery	12.3	35.0	123.0
Farm forest products	12.0	35.7	74.4
Other crops	1.4	5.1	14.5
Total	182.3	620.7	645.0
Total livestock, products, crops	647.3	1,613.9	2,075.8
Government payments	79.6	12.6	79.8
Total cash farm receipts	726.9	1,626.5	2,155.6
Nonfarm commercial timber	NA[2]	86.1	208.4
Total farm and forestry receipts	NA[2]	1,712.6	2,364.0

[1]Source: Alabama Agricultural Statistics, various issues. Totals may not add due to rounding.
[2]Not available.

Can Gramoxone Replace Dinoseb?

G.W. WEHTJE

THE CANCELLATION of Federal use labels of dinoseb-containing herbicides by the Environmental Protection Agency in the fall of 1986 has left both peanut farmers and weed science reseachers diligently searching for replacement products. The front runner in the dinoseb replacement race appears to be Gramoxone®. Though the leader, Gramoxone has plenty of competition as reported in a previous *Highlights* article ("Peanut Weed Control After Dinoseb," Spring 1988).

Gramoxone was previously sold in the United States as paraquat, which is also the active ingredient. It was used extensively in Alabama, as well as in other peanut-producing states, in 1987, under a Section 18 emergency use label. Though none of the potential dinoseb replacements, including Gramoxone, are identical to dinoseb, each has strengths and weaknesses.

In contrast to dinoseb, Gramoxone is more active on Texas panicum and Florida beggarweed, two troublesome weeds in peanut production. In respect to Florida beggarweed, even seedlings that are past the cotyledon stage of growth can be controlled with typical use rates. Gramoxone has proven to be effective in controlling sicklepod, if these weeds have no more than one true leaf. In contrast to this, farmers have found that smallflower moringglory and bristly starbur are not readily controlled with Gramoxone.

The performance of Gramoxone, and potentially with all postemergence-applied herbicides, can be strongly influenced by environmental conditions at the time of application. During 1987, it was observed that hot-humid conditions with intense sunlight rendered Gramoxone much more active. Under these conditions, excessive and undesirable injury may result. This tendency to cause injury to peanut plants is probably the most unacceptable feature of Gramoxone. However, research has revealed that most injury is generally transitory and not reflected in yield. Researchers are currently seeking ways to tailor rates for these situations, as was done with dinoseb when it was introduced into the peanut market in the late 1960s.

Previous research at the Alabama Agricultural Experiment Station indicated maximum weed control and minimum injury require fairly exact application timing of Gramoxone. Application delayed beyond 28 days after cracking increases the chances for excessive injury and yield loss. In this respect, Gramoxone does not appear to have the flexibility and is not as forgiving as dinoseb.

Since Gramoxone can be somewhat ineffective against some weeds, there is interest in tank mixing it with other herbicides. Unfortunately, Gramoxone cannot be indiscriminately tank mixed. Research has indicated that the activity of Gramoxone can be reduced if tank mixed with either Amiben® or Alanap®. These combinations are desired since Amiben and Alanap could contribute soil residual activity to the tank mix.

In contrast to this, there are early indications that some tank mix combinations result in an overall improvement in performance. For example, tank mixing Gramoxone with either Basagran® or 2,4-DB results in increased activity on hard-to-control species, such as morningglory and bristly starbur, and there is no indication that the Gramoxone activity is diminished in these mixtures.

The normal use rate for a single application of Gramoxone is 11 oz. per acre, which gives a chemical cost of $2.70 per acre, making it a cost-effective treatment. During 1985-87, a series of Gramoxone-based treatments and a traditional dinoseb-based treatment were compared in terms of weed control, yield, and net returns. The greatest peanut yield (3-year average of 4,010 lb. per acre) and net returns ($175 per acre) were provided by a system that utilized two postemergence applications of Gramoxone followed by Fusilade® and later by 2,4-DB. In contrast to this, a system that utilized Balan® applied preplant incorporated at 4 qt. per acre, followed by Lasso (3 qt. per acre) plus Dyanap® (4 qt. per acre) had an average yield of 3,450 lb. per acre and a net return of $92 per acre. The superior performance of the Gramoxone treatment can be partially attributed to superior low cost weed control. The test area was heavily infested with Texas panicum and Florida beggarweed, on which Gramoxone is more effective than dinoseb.

Gramoxone was recently granted a full Federal Registration by the Environmental Protection Agency for use on peanuts.

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Cuphea plant in bloom.

Controlling Mosquitoes with *Cuphea* Seeds Could Offer Cropping Opportunity

G.R. MULLEN

SUBSTANCES in the seeds of tropical and subtropical plants in the genus *Cuphea* have been found to disrupt normal egg laying behavior by mosquitoes. This discovery by Alabama Agricultural Experiment Station researchers has led to studies to evaluate the effectiveness of *Cuphea* seeds as mosquito egg laying deterrents. If such use proves practical, this could provide an added market if *Cuphea* becomes a commercial crop.

Nearly 300 species of *Cuphea* are found in Central and South America. They represent a highly diverse group of herbaceous and shrubby plants, including both annual and perennial species. Occasionally they have been used as ornamentals but otherwise have had no commercial value. Five species grow wild in the United States, where they are known as waxweeds or tarweeds.

In 1957, the USDA began a screening program to identify plants as potential sources of oils and fatty acids for commercial and industrial purposes. These substances are widely used to make oil-based paints, soaps, detergents, surfactants, and lubricants. They are also being used in the medical field. *Cuphea* seeds are rich in short-chain fatty acids which are in high demand because of their special chemical properties.

Based on evidence that other short-chain organic compounds can interfere with egg laying (oviposition) by mosquitoes, a study was designed to see if components of *Cuphea* seeds would adversely affect mosquito oviposition. Seeds of five *Cuphea* species were obtained from the USDA-ARS Plant Introduction Station at Iowa State University: *C laminuligera, C. lanceolata, C. leptopoda, C. lutea,* and *C. painteri.* They were crushed and ground with a mortar and pestle, and applied to the water surface of oviposition containers made of 1-pt. cardboard cups painted black inside and out and lined with a strip of brown paper towel. Each contained about 1½ oz. of tap water that had been allowed to stand overnight. These were placed in cages containing 200-300 female mosquitoes.

The mosquitoes could lay their eggs in either the treated containers or untreated controls containing only tap water. All tests were conducted with laboratory-reared mosquitoes (*Aedes aegypti*) that had fed on rabbit blood 4 to 9 days prior to each oviposition experiment. Under these conditions, this mosquito characteristically lays its eggs on the moist paper towel just above the water line.

The number of mosquito eggs deposited in containers treated with *Cuphea* seeds was significantly lower than that in untreated controls. The greatest reduction in egg numbers occurred in containers treated with seeds of *C. painteri,* with up to 92% fewer eggs being deposited in some tests. The percent reductions in the number of eggs deposited in each treatment were: *C. painteri* (70%), *C. laminuligera* (70%), *C. leptopoda* (64%), *C. lutea* (63%), and *C. lanceolata* (38%).

Containers treated with crushed *Cuphea* seeds not only had fewer eggs but, as shown in the figure, the pattern in which they were deposited was also affected. Mosquitoes tended to scatter their eggs well above the water line when laying in *Cuphea*-treated containers. This contrasts sharply with normal oviposition in which the eggs are concentrated nearer to the water surface.

No correlation was found between the fatty acid composition of *Cuphea* seeds and the reductions in egg numbers. The two most effective seeds, based on these preliminary studies, differ noticeably in the relative amount of caprylic, capric, and lauric acid in their seeds: *C. painteri* was highest in caprylic acid (65% of total oil), while *C. laminuligera* was highest in lauric acid (63%). The next most effective seeds, *C. leptopoda*, were highest in capric acid (87%). It is possible that all three fatty acids effectively discourage mosquito oviposition. The deterrent effect, however, may be enhanced by various combinations and relative amounts of these same compounds.

Success in development of *Cuphea* as a commercial crop could provide a ready source of these natural fatty acids as potential mosquito control agents.

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