

**OPERATIONAL AND COSTS  
CHARACTERISTICS  
OF THE MISSISSIPPI COTTON  
GINNING INDUSTRY**  
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**Abstract**

A survey of Mississippi cotton gins was conducted to ascertain the current state of the ginning industry. Questions about capacity, transportation costs, ginning costs, and trash handling were administered. The primary results showed that the ginning industry in Mississippi has excess capacity, with the largest gins exhibiting the most excess capacity. Transportation costs ranged from \$2.12/bale to \$3.82/bale across gin sizes. Ginning cost ranged from \$33.85/bale to \$40.12/bale across gin sizes. The total cost for ginning services in Mississippi in 1997 was estimated to be \$69.6 million.

**Introduction**

Cotton plays a vital role in the United States agricultural economy. United States cotton producers grew about 20 percent of the world's 88 million bale crop in 1995 (Smith et al.). Cotton plays an even larger role in Mississippi's economy. Cotton led all row crops in Mississippi in 1996 with cash receipts of \$649 million and Mississippi was the fourth leading cotton producer in the U.S. that year. Cash receipts from cottonseed produced in Mississippi totaled \$77.1 million in 1996 (Mississippi Department of Agriculture and Commerce-NASS, 1996).

The amount of cotton produced in Mississippi affects more than just cotton producers. Cotton requires an extensive infrastructure and provides a stimulus to the Mississippi economy. There are approximately 4,044 businesses that are cotton-related in Mississippi and these firms employ over 22,000 Mississippians (Mississippi Department of Agriculture and Commerce-NASS, 1996). The ginning industry is an example of such a business that is almost completely dependent on cotton production. In 1997, there were 127 active gins in the state of Mississippi, the majority of which are concentrated in the portion of the state known as the Delta. The remaining gins and cotton acreage are spread across the central and the northeastern regions of the state (Robinson and Mancill).

In recent years, there has been little information reported on the operational and cost characteristics of the ginning

industry in Mississippi. The purpose of this report is to gather, document, and report data gathered concerning Mississippi's cotton ginning industry. Gins were grouped by agricultural statistical districts used by the Mississippi Department of Agriculture and Commerce; however, some modifications were made in order to keep all responses confidential. These regions and how they will be identified throughout the report are shown in Figure 1.

**Methods and Procedures**

A survey was mailed to 120 Mississippi cotton gins during the summer of 1998. The location, phone number, and mailing addresses of these gins were obtained from the Southern Cotton Ginners Association. The survey's primary objective was to determine the operational structure and the processing capacity of Mississippi cotton gins. Ginners were asked questions that pertained to gin capacity (both hourly and seasonal capacity of the gin); total cost of ginning per bale; transportation costs, including both trailer and module; the percentage of module-hauled cotton versus trailer-hauled cotton; the amount of computer use in the ginning process; and the ownership structure of the gin. Responses from the questions concerning gin capacity were used to calculate rated capacity, processing capacity, and maximum seasonal capacity for both the industry and for gins in various size groups. Rated capacity refers to the number of bales per hour (bph) a ginner could process under ideal conditions. Maximum seasonal capacity is also a measure of the number of bales processed under ideal conditions; except in this case, it refers to the maximum number of bales a gin can process in one season under ideal conditions. Processing capacity refers to the actual number of bales per hour a ginner processed during the 1997 crop year. Survey respondents were asked to provide data reflecting the 1997 crop year.

Responses to some of the questions in the survey were classified into four different size groups, similar to that used by Misra, et. al. in their study of the ginning industry in the Texas High Plains (Misra et al.). These four size groups were based on the average bales per hour processing capacity, and were defined in the following manner:

- (Size 1) Up to 14 bph,
- (Size 2) 15-21 bph,
- (Size 3) 22-28 bph, and
- (Size 4) Greater than 28 bph.

Average ginning cost per bale, total ginning cost, and seed cotton transportation cost were calculated for each size group and for the overall Mississippi ginning industry. Using the responses on the surveys and data from the National Agricultural Statistics Service (NASS), gin distribution and the processing volume by size group was determined for the Mississippi ginning industry. An estimation of the total number of gins in each size category was made based on NASS data. The total number of bales

processed for the 1997 season was derived by multiplying the average number of bales processed per gin for each size group (as determined from the survey responses) times the number of estimated gins in that size group. To determine average transportation cost, the average per bale transportation cost for each respective size group was multiplied by the average number of bales ginned for that size category. The average ginning cost per bale for each group was multiplied by the average number of bales ginned to derive total ginning cost for each group. By looking at these types of costs (both industry wide and within each size group), ginners can gain a better perspective of the operational and cost characteristics of the cotton ginning industry in Mississippi.

## **Results**

### **Responding Gin Characteristics**

Of the 120 original surveys sent in the mail, a total of 48 gins returned usable questionnaires. This represents a usable response rate of approximately 40%. Active gins are located in 36 counties throughout the state and gins in 23 of these counties returned usable surveys. Table 1 indicates that the Lower Delta and the Upper Delta regions of the state had the highest number of surveys returned, with 27 and 15 surveys returned, respectively. Gins responding from the Central region of the state reported the highest average rated capacity at 29.50 bales per hour. However, the Lower Delta region of Mississippi reported the highest actual processing capacity at 21.95 bales per hour, this suggesting that gins in the Delta are more fully utilizing their capacity. Responding gins in the Northeast region of the state averaged the lowest rated capacity and actual processing capacity at 12.5 bph and 12 bales per hour, respectively. The gins in this region also had the lowest maximum seasonal capacity at 2,250 bales per gin. Results of this survey suggest that the gins in the Northeast are operating near capacity. The Central region of the state reported the highest maximum seasonal capacity per gin with 36,300 bales. Table 1 provides a summary of the characteristics of the gins that participated in the survey.

### **Gin Operation Characteristics**

Table 2 provides a summary of the operational characteristics as determined from the survey responses of the Mississippi ginning industry such as gin capacity, season length, and the amount of cotton processed by responding gins. Survey responses indicate that the average rated hourly capacity of the responding gins was approximately 25 bales per hour; however, the average processing rate of responding gins in 1997 was approximately 20 bales per hour. This suggests that, on average, gins in Mississippi have an excess capacity of 5 bales per hour. In many cases, the lack of cotton available (due to variable cotton acreage and or variable yields) for ginning explains the difference found in the rated capacity and the actual capacity of the gins. Other factors such as

down-time for shift change and cleanup may also play a role in explaining this difference, but to a lesser extent.

Responding ginners reported that the ginning season for Mississippi gins in 1997 ranged between 30 and 91 days, with an average ginning season of 60 days. There was no definable relationship between season length and gin size. The average ginning season for gins processing up to 14 bales per hour was 61 days, 57 days for size 2, 57 days for size 3, and 62 days for size 4. Mississippi gins operated approximately 17 hours per day, on average, with an average down-time of about 2 hours.

### **Processing Volume and Seasonal Capacity**

Table 3 is a summary of the processing volume by gin size as determined from the survey responses. Breaking down the processing volume by gin sizes revealed that gins in the size 1 group (up to 14 bph) processed an average of 10,027 bales per gin during 1997, size 2 gins (15-21 bph) processed 15,001 bales per gin, and size 3 gins (22-28 bph) processed 20,611 bales per gin. The largest gins with capacities greater than 28 bales per hour ginned an average 29,363 bales per gin during the 1997 ginning season (Table 3).

Data show that there were 75 gins in size group 1 (up to 14 bph), 17 gins in size group 2 (15-21 bph), 31 gins in size group 3 (22-28 bph), and 4 gins in size group 4 (greater than 28 bph) in Mississippi in 1997 (United States Department of Agriculture-NASS, 1998). To obtain the total number of bales processed, the number of gins in each size group (as reported by NASS) was multiplied by the average processing volume per gin for each size group (as determined from survey responses). This resulted in a total processing volume of 1.7 million bales in the 1997 season (Table 3). By comparison, NASS reported the actual number of bales ginned in 1997 was 1,766,450 (United States Department of Agriculture). Given the similarity of the estimated and actual total bales processed, it can be concluded that the numbers generated from the survey responses are probably representative of the actual conditions in the Mississippi ginning industry. Based on survey responses, it was estimated that size 1 gins (up to 14 bph) ginned approximately 43% of the total processing volume. Gins with capacities of 15 to 21 bph processed about 14% and gins with 22 to 28 bph processing capacity ginned approximately 36% of the total volume. The largest capacity gins processed the least amount of cotton at 117,452 bales or approximately 7% of the total volume (Table 3).

Ginners were also asked to report what they believed to be their maximum daily capacity. That is, ginners were asked to provide their estimate of the maximum amount of cotton they could process in a 24 hour period under ideal conditions. This was divided by the numbers of hours processed in that 24 hours to derive a maximum hourly capacity. This maximum hourly capacity was multiplied by the average season length and hours of processing time per

day to determine maximum seasonal capacity. Gins in the four size categories responded in the following manner: Size 1 gins (up to 14 bph) were estimated to have a perceived average maximum seasonal capacity of 11,049 bales per gin, size 2 gins (15-21 bph) were estimated to have a perceived average maximum seasonal capacity of 16,991 bales per gin, size 3 gins (22-28 bph) were estimated to have a perceived average maximum seasonal capacity of 24,812, and size 4 gins (greater than 28 bph) were estimated to have a perceived average maximum seasonal capacity of 40,796 bales per gin (Table 3). Extrapolation of the reported total maximum seasonal capacities per gin by size groups for the Mississippi ginning industry showed a total maximum seasonal capacity of about 2.0 million bales for Mississippi in 1997 (Table 3).

Comparison of the actual processing volume to maximum seasonal capacity reveals that the ginning industry in Mississippi had an excess capacity of 286,443 bales in 1997, indicating approximately 14% of unused capacity. The smaller gins (size 1 and 2 gins) operated with an excess capacity of 9% and 12% respectively, while the larger gins operated with excess capacities of 17% and 28%. It is likely that the larger gins have volumes that allow this size gin to sustain more excess capacity. However, these gins may be in a more precarious position if cotton acreage continues to decline.

#### **Transportation Cost Characteristics**

Eighty-five percent of the usable responses indicated that the ginners transported seed cotton from the producer's field to the gin. Approximately 87% of the cotton coming to the gins was transported by module. Gins paid the cost of transporting the cotton to the gin by module 98% of the time. The remaining cotton was transported to gins using trailers, and producers incurred that cost 97% of the time. The average distance of transporting cotton from the farmer's field to the gin was approximately 12 miles. The average transportation cost was \$43.95 per module. An average of 13.64 bales of cotton was transported in one module. These data suggest an average module transportation cost of \$3.22 per bale or \$0.27 per bale per mile. Gins using trailers to transport cotton from the field to the gin showed an average transportation cost of \$7.22 per trailer. The average number of bales per trailer was 6.75 bales and the average distance of hauling cotton from the field to the gin in a trailer was 7.57 miles. These results indicate a cost of \$1.07 per bale or \$0.14 per bale per mile for trailer transported cotton.

Size 3 gins (22-28 bph) experienced the highest transportation cost at \$3.82 per bale, while size 1 gins (up to 14 bph) had the lowest cost at \$2.12 per bale. Size 2 and 4 (15-21 bph and greater than 28 bph) incurred costs of \$2.39 and \$3.48 per bale, respectively (Table 5). The total module transportation cost for the ginning industry in Mississippi in 1997 was estimated at approximately \$5.0 million (Table 5). Transportation cost for trailer hauled

cotton was not analyzed in the same manner as cotton hauled by module. In most instances (97% of the time), producers incurred the cost of hauling seed cotton to the gin by trailer. Therefore, gins rarely have to account for this type of transportation cost.

#### **Ginning Cost Characteristics**

Average ginning cost (variable and fixed) in the 1997 season for the responding gins was calculated at \$35.96 per bale. Small gins with capacities below 14 bph had a ginning cost of \$36.97 per bale, while gins with capacities of 15 to 21 bph reported an average cost of \$40.12 per bale. The costs for the two larger size gins were \$35.29 for gins with 22 to 28 bph and \$33.85 for gins with greater than 28 bale per hour capacity (Table 6).

In general, ginning volume is expected to be inversely related to average cost. That is, as processing volume increases in a given plant size, average cost is expected to decline. However, this was not what the survey data indicated for the gins in the size 2 group. The reason for this result is not completely clear but, it could be that data for this size group were misreported by the respondents. Alternatively, it could be that many small gins are older and fully depreciated. If this is the case, reported average cost could be much lower than expected for newer gins. Thus, it could be that the cost reported for size 1 is small compared to size 2 gins. The total cost of ginning in 1997 for the Mississippi ginning industry was calculated at about \$64.5 million (Table 6).

#### **Gin Trash Disposal Methods**

Ginners in Mississippi were asked how the gins disposed of the large volume of gin trash that is created during the ginning process. Table 7 is a summary of the methods used by the responding ginners to dispose of the gin trash. On-site composting and composting on farmer's fields are the preferred methods of trash disposal. However, a variety of methods are used, with some gin trash being used as flower-bed mulch.

#### **Total Cost for Ginning in 1997**

Ginning industry costs for Mississippi were calculated by adding total transportation costs and total ginning costs for each size group. Results indicate that the ginning industry incurred a combined cost of approximately \$69.6 million in 1997 (Table 8). Smaller gins with capacities below 14 bales per hour incurred approximately \$29.3 million, size 2 gins (15-21 bph) showed about \$10.8 million, and size 3 gins (22-28 bph) carried about \$24.9 million of the combined industry cost. The largest gins with capacities greater than 28 bales per hour incurred \$4.3 million of the combined industry costs.

As one might expect, ginning costs accounted for 93% of the combined industry cost. Given that the Mississippi ginning industry processed over 1.7 million bales of cotton in 1997, results indicate that the ginning industry

experienced a combined cost of about \$39.47 per bale, or 7.9 cents per pound of cotton. The most commonly reported gin charge was 8 cents per pound of cotton, indicating that the industry was covering variable and fixed costs.

### **Computer Usage**

Approximately 42% of the ginners in Mississippi characterized their use of computers in the ginning process as "Some." The remaining responses were split between "No Use" (30.19%) and "Extensive Use" (28.30%).

### **Ownership Structure**

As a final question, ginners were asked to describe the ownership structure of their gin. Respondents could choose from one of the following descriptions: sole proprietorship, cooperative, partnership, corporation, and other. Corporation was, by far, the preferred ownership method preferred by ginners. Approximately 79% of Mississippi gins are set up as corporations. Cooperatives are the next largest business organization representing approximately 15% of active gins, followed by sole proprietorships (4%) and partnerships (2%).

### **Summary of Results**

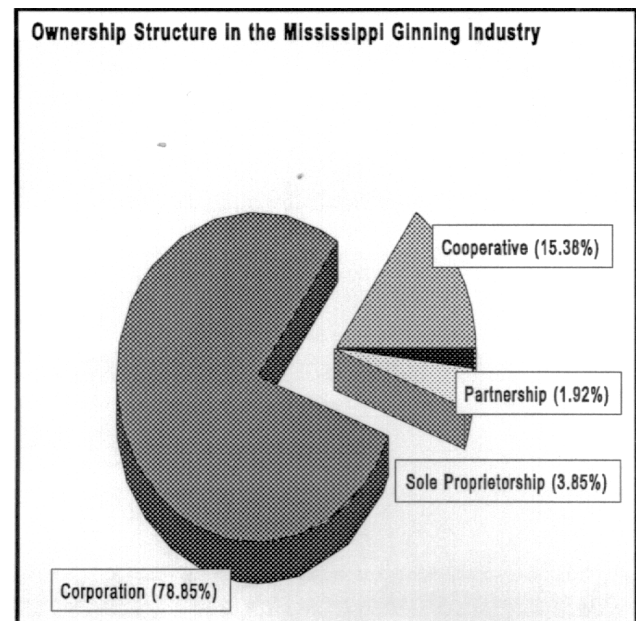
During the summer of 1998, a survey was mailed to 120 Mississippi cotton gins to determine the operational structure and the processing capacity of Mississippi cotton industry. Forty-eight gins returned usable questionnaires, representing a usable response rate of approximately 40%. Gins from 23 of the 36 counties that have cotton gins participated in the survey. Important findings are presented in Table 9.

Eighty-five percent of the responding gins indicated that the gin transported seed cotton from the producer's field to the gin. Approximately 87% of the cotton coming to the gins was transported by module at an average cost of \$43.95 per module, or \$3.22 per bale or \$0.27 per bale per mile. The non-moduled cotton was transported to gins using trailers. Producers incurred the cost of transporting the cotton to the gin by trailer 97% of the time. The cost of hauling cotton to the gin by trailer was \$1.07 per bale or \$0.14 per bale per mile.

The transportation issue also relates indirectly to the issue of declining acreage. In a recent study, Parvin and Cleveland report that cotton acreage in Mississippi is on the decline (Parvin and Cleveland). The authors cite several reasons for this decline including recent changes in farm legislation and current relative future prices for cotton and alternative crops. This issue of declining cotton acreage in Mississippi concerns many in the agricultural sector, especially ginners. As small gins are forced to shutdown (due to declining cotton acreage and or declining cotton yields) the transportation costs will become higher for the remaining gins.

During the 1997 season, the average rated hourly capacity of responding gins was approximately 25 bales per hour; however, the actual processing volume was approximately 20 bales per hour. The average length of the ginning season was about 60 days. Mississippi gins operated approximately 17 hours per day on average, with an average down-time of about 2 hours. Responding gins reported an average ginning cost (variable and fixed) of about \$35.96 per bale. Combined cost (transportation cost + ginning cost) was estimated at \$39.18 per bale.

Based on the gin size distribution in the National Agricultural Statistics Service's May 1998 Cotton Ginnings Annual Reports, it was determined that there were 75 gins with processing capacity up to 14 bph, 17 gins with processing capacity between 15 and 21 bph, 31 gins with 22 to 28 bph processing capacity and 4 gins with greater than 28 bph processing capacity in Mississippi in 1997. It was estimated based on these data that the Mississippi ginning industry processed about 1.7 million bales of cotton in the 1997 season. The total maximum seasonal capacity for the Mississippi ginning industry was, however, estimated at about 2.0 million for the same time period. These results suggest that the Mississippi ginning industry had an excess capacity of 286,443 bales in 1997, or 14%. It was further observed that smaller gins operated with smaller amounts of excess capacity than larger capacity gins.



The total module transportation cost for the Mississippi ginning industry in 1997 was estimated at approximately \$5.0 million, and the total cost of ginning for the Mississippi ginning industry was calculated at about \$64.5 million. Combined ginning industry operational cost for Mississippi was calculated by adding total transportation costs and total ginning costs. Results indicate that the

Mississippi ginning industry incurred a total combined cost of approximately \$69.6 million.

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Table 1. Responding Mississippi Gin Characteristics, by Region.

Region	Number of Gins in Each Region, 1997	Total Number of Surveys Returned	Number of Useable Surveys Returned	Avg. Rated Capacity (bph)	Avg. Processing Capacity Per Gin (bph)	Seasonal Capacity Per Gin (bales)
1-Upper Delta Region	33	15	14	22.91	19.12	26,590
2-North Central Region	13	6	4	18.42	15.28	19,131
3-Northeast Region	6	2	1	12.50	12	2,250
4-Lower Delta & Southwestern	52	27	22	27.46	21.95	26,563
5-Central Region	13	7	5	29.50	20.60	36,300
6-East Central Region	3	2	2	24.10	14.50	19,870
7-South Central Region	no gins	no gins	no gins	no gins	no gins	no gins
8-Southeast	no gins	no gins	no gins	no gins	no gins	no gins

Table 2. Estimated Gin Characteristics of the Mississippi Ginning Industry Using Survey Data, 1997.

	Mean	Standard Deviation	Minimum	Maximum
Rated Capacity (bph)	25.15	8.93	10.90	54.50
Processing Rate (bph)	19.90	6.23	8.10	40
Season Length (days)	59.13	14.92	30	91
Hours Ginned Daily	17.38	5.04	6	24
Daily Down-Time Hours	2.12	1.76	0	8
Max. Seasonal Capacity (bales)	26,757	15,136	2,250	65,465

Table 3. Estimated Processing Volume and Seasonal Capacity of the Mississippi Ginning Industry Using Survey Data, 1997.

Size Group	Number of gins	1997 Average Processing Volume (Bales/gin)	1997 Total Bales Processed	Seasonal Capacity (Bales) Per Gin	Seasonal Capacity (Bales) Total
Size 1 gins (<14 bph)	75	10,027	752,025	11,049	828,675
Size 2 gins (15-21 bph)	17	15,001	255,017	16991	288,847
Size 3 gins (22-28 bph)	31	20,611	638,941	24,812	769,172
Size 4 gins (>28 bph)	4	29,363	117,452	40,796	163,184
<b>TOTAL</b>			<b>1,763,435</b>		<b>2,049,878</b>

Table 4. Estimated Transportation Costs and Characteristics of the Mississippi Ginning Industry Using Survey Data, 1997.

	Mean	Standard	Minimu	Maximu
	Deviatio	n	m	m
Distance Hauled by Module (miles)	11.97	5.72	4	28
# of Bales per Module	13.64	0.94	12	16
Transportation Cost per Module	\$43.9	\$25.09	\$3.00	\$100.00
Module Transportation Cost per Mile	\$0.27	NA	NA	NA
Distance Hauled by Trailer (miles)	7.57	3.36	0	14
# of Bales per Trailer	6.75	2.32	0	11
Transportation Cost per Trailer	\$7.22	\$9.24	0	\$24.00
Trailer Transportation Cost per Mile	\$0.14	NA	NA	NA

Table 5. Estimated Module Transportation Costs for the Mississippi Ginning Industry Using Survey Data, 1997.

Gin Size	Bales Ginned	Transportation Cost Per Bale (\$)	Total Transportation Cost (\$)
Size 1 gins (<14 bph)	752,025	2.12	1,594,293.00
Size 2 gins (15-21 bph)	255,017	2.39	609,490.63
Size 3 gins (22-28 bph)	638,941	3.82	2,440,754.62
Size 4 gins (>28 bph)	117,452	3.48	408,732.96
<b>TOTAL</b>			<b>5,053,271.21</b>

Table 6. Estimated Ginning Costs for the Mississippi Ginning Industry Using Survey Data, 1997.

Gin Size	Bales Ginned	Ginning Cost Per Bale (\$)	Total Ginning Cost (\$)
Size 1 gins (<14 bph)	752,025	36.97	27,802,364.25
Size 2 gins (15-21 bph)	255,017	40.12	10,231,282.04
Size 3 gins (22-28 bph)	638,941	35.29	22,548,227.89
Size 4 gins (>28 bph)	117,452	33.85	3,975,750.20
<b>TOTAL</b>			<b>64,557,624.38</b>

Table 7. Gin Trash Disposal Methods used by the Responding Mississippi Gins, 1997.

	Mean	Standard	Minimu	Maximu
	Deviatio	n	m	m
% of Gin Trash Taken Directly to Farmers Field For Composting	35.7	47.70	0	100
% of Gin Trash Composting On-Site	45.8	49.44	0	100
% of Gin Trash Composting Off-Site	13.7	33.39	0	100
% of Gin Trash Taken Directly to Feedlots and Other Livestock	2.34	14.59	0	100
% of Gin Trash Used for Other Purposes	0.23	1.46	0	10

Table 8. Estimated Combined Cost to the Mississippi Ginning Industry Using Survey Data, 1997.

	Total Transportation Cost	Total Ginning Cost	Total Industry Cost
Size 1 gins (<14 bph)	1,594,293.00	27,802,364.25	29,396,657.25
Size 2 gins (15-21 bph)	609,490.63	10,231,282.04	10,840,772.67
Size 3 gins (22-28 bph)	2,440,754.62	22,548,227.89	24,988,982.51
Size 4 gins (>28 bph)	408,732.96	3,975,750.20	4,384,483.16
<b>Total</b>	<b>5,053,271.21</b>	<b>64,557,624.38</b>	<b>69,610,895.59</b>

Table 9. Summary Table of the Mississippi Ginning Industry Using Survey Results, 1997.

	Size 1 gins (<14 bph)	Size 2 gins (15-21 bph)	Size 3 gins (22-28 bph)	Size 4 gins (>28 bph)	Industry Averages Based on Survey Data
# of gins	75	17	31	4	127
Processing Volume/gin (bales)	10,027	15,001	20,611	29,363	20,451
Maximum Seasonal Capacity/gin (bales)	11,049	16,991	24,812	40,796	25,846
Trans. Cost/bale	2.12	2.39	3.82	3.48	3.22
Ginning Cost /bale	36.97	40.12	35.29	33.85	35.96
Combined Operational Cost (\$/bale)	39.09	42.51	39.11	37.33	39.18

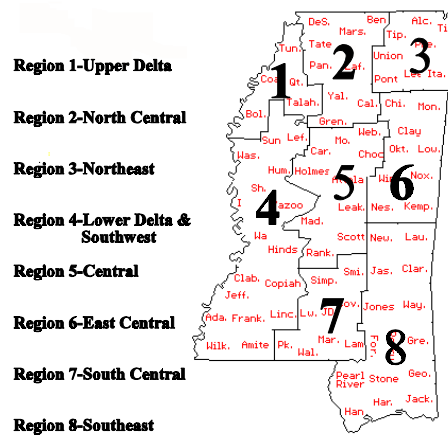


Figure 1. Eight Mississippi Regions used in Survey.