

**NORTH CAROLINA**

**EXPERIMENTAL COTTON SURVEYS**

**1953**

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## FOREWORD

Funds were provided by the 83rd Congress for conducting research in the Agricultural Estimates Division. It was determined to use a major portion of the funds to conduct research on ways and means of improving the acreage and production estimates for cotton. North Carolina was chosen as one of the two states in which this research work was to be conducted in the crop year 1953. North Carolina is one of the important smaller cotton producing states in the rainfall cotton belt. Mississippi, the second largest producing state, was chosen as the other state in which to conduct experimental cotton surveys.

The personnel assigned to conduct the research work in North Carolina consisted of one professional statistician and two clerks. In addition, many members of the regular staff, professional and clerical, absorbed portions of the work load during peak periods. Their participation was invaluable in completing the work successfully and stemmed from their keen interest and desire to improve the methods of the regular program.

SUMMARY OF RESULTS FROM NORTH CAROLINA EXPERIMENTAL  
COTTON SURVEYS FOR 1953

- Introduction -

These monthly surveys represent an attempt to conduct scientifically designed mail surveys. Because of the importance of cotton estimates and the availability of a "complete" list, large-scale pilot surveys were conducted in the State throughout the season on a cross-section sample of the 1950 FMA contract holders. These surveys were made by mail, but a sample of the non-respondent growers was visited at critical times during the season to keep these important bench marks representative. The purpose of the study was to minimize or completely eliminate any serious bias from being carried forward from month to month. The estimates made from such a sample are free from many of the objections which have been raised against the selective samples currently in use. Current mailing lists themselves are not cross-section samples; in addition, further selectivity is introduced by the failure of some farmers to respond. Adjustments for selectivity in these surveys were not made on the basis of past experience, thus avoiding the danger in assuming that past relationships and trends which have worked well in the past will continue to hold. The type of survey conducted eliminates such uncertainties.

There is also reason to believe that in years of large changes in acreage or production such a procedure would measure those changes more effectively. Therefore, the study was designed to show how much improvement would result from improvement of the sample alone and how rapidly such a system could be brought under effective administrative control. However, continued reliance was placed on the validity of individual farmer's reports on acreage, prospective yields, and final production.

- The Sample -

The sample size was set to give State estimates of such precision as to provide usable State figures and to be on the scale desired if the program was extended to the entire cotton belt. The sampling error was set at 5 per cent in North Carolina with the expectation that a 1 per cent error at the National level would be desired. A sample of 5,616 contract holders was drawn from the 1950 FMA list of farm owners having cotton allotments. A systematic sample of every 20th contract number was drawn in the county FMA office by FMA personnel and forwarded to the State office. The entire sample was circularized as of July 1 with 3 mailings to get information on 1953 cotton acreage and 1952 acreage and production. Approximately 44 per cent or 2,482 of the farmers responded by mail. About one-sixth or 525 of the non-respondents were interviewed in July. During the other months, August through December, only one-half of the July mail respondents were circularized while all of the 525 July non-respondents interviewed were mailed schedules. These monthly mail surveys were conducted to get

information on prospective yield, production and acreage for harvest. A 30 percent return was anticipated. However, the response from the list of July respondents ran about 20 per cent and the response from the July non-respondents interviewed was less than 10 per cent. In addition to the mail surveys, a sample of approximately 150 non-respondents was interviewed in September and December.

The response to the various monthly inquiries as well as the number of interviews are shown in Table 1.

Table 1 - Response to Mail Inquiry -

MONTH	July Respondents				July Non-Resp. Interviews*			
	Total Number	Mail Returns		Inter-views	Total Number	Mail Returns		Inter-views
		Number	% Ret'd			No.	% Ret'd	
July	5616	2482	44	-	525	-	-	525
August	1453	332	23	-	525	40	8	-
September	1453	298	21	73	525	42	8	74
October	1453	285	20	-	525	44	8	-
November	1453	301	21	-	525	40	8	-
December	1453	275	19	73	525	33	6	79

\*A systematic sample of the 3134 July non-respondents

- Estimating Procedures -

It was intended that 1950 cotton allotments be used as a basis for expanding the sample data to State estimates. This proved unsatisfactory because of lack of comparability between reporting farms and the way those farms are constituted in the FMA records. Many farming operations are covered by more than one FMA contract regardless of the number of FMA farms that may be involved. This was anticipated and various methods of dealing with it were considered before the surveys were started. When tabulating a farmer's report it is necessary to know the 1950 allotment for his reported "farm". Presumably adjustments could be made for the lack of comparability, and the allotment for the farm as constituted in 1950 used, if the number of FMA contracts covering a farmer's operation were known. Supposedly this could be handled simply by asking the growers how many FMA contracts cover his reported operation. That was not done for two reasons: (1) As some actual changes in the constitution and tenure of farms had taken place since 1950, it was felt many farmers would not know how many 1950 FMA contracts covered the land they were currently operating. (2) It was also believed that reference to FMA contracts might lead farmers to bias their replies because new allotments were in prospect. As the next best alternative, it was decided to use reported "land in farm" as a guide. Comparing the reported size of farm with the farm size listed in the FMA records was thought to provide an index of the number of FMA farms covered by each report; the reported data were adjusted on that basis.

In practice this procedure gave disappointing results for several

reasons. First of all it was discovered that a farmer's reported "size of farm" is often not a good index of the farm land he is actually operating. He usually includes land that is rented out and farmed by others; he also generally includes land that he has rented in from others. There are some exceptions to this in that a farmer quite often omitted small cultivated acreages that were rented in. Most farmers renting out land also included the cotton on that land while at the same time the farmer renting in the land generally included this ~~same~~ cotton acreage. This caused an unknown amount of "double reporting" of cotton acreage as well as making the 1953 reported cotton acreage and the 1950 PMA allotment data for these farms relate to different units. Furthermore, many farmers report only the total cropland as total land in farm. This was especially serious in the mail survey as only total land was asked on the questionnaire.

The questionnaire used for the non-respondent interviews asked for both land in farm and cropland and had this difficulty to a much less extent. As these difficulties had not been anticipated, no satisfactory adjustments could be made. Experience gained in these surveys does indicate the changes that are needed in our questionnaires to correct the difficulty in future work. For one thing, it seems evident that "farm land" or "cropland" would perhaps be preferable to cotton allotments as a basis for estimating and that questionnaires can be designed in such a way as to insure that those data are reported properly. In general, these difficulties suggest that the design of a set of questionnaires for making direct expansions from sample data will likely require some additional questions so as to assure greater consistency in reporting.

The questionnaires asked for data on "last year's cotton acreage and production" as well as for current data. As data for the two years seemed consistently to cover the same farming operation, it was found that "last year's production" provided a suitable basis for expansion of the sample data. The monthly expansions using the 1950 allotments data were consistently too high, averaging 15 to 20 per cent above the Board Estimates.

- Acreage Estimates -

The Survey results for acreage in cultivation July 1 and harvested (or expect to harvest) are given using "bales produced last year" as the expansion factor for the critical months to determine acreage.

Table 2 - Survey and Board Estimate of Acreage -

ITEM	Survey (000 acres)	Board (000 acres)	Survey as % Board
July 1 - Acres in Cultivation	738	770	95.8
Sept. 1 - Acres for Harvest	729	762	95.7
Dec. 1 - Acres Harvested	783 <u>1/</u>	775 <u>1/</u>	101.0

1/ PMA measurements of planted acreage were available in December.

- Production Estimates -

The prospective production from these Surveys compared with the Board forecasts for August through December are shown in Table 3.

Table 3 - Survey and Board Forecasts of Production -

MONTH	Survey (000 bales)	Board (000 bales)	Survey as % Board
August	532	460	115.7
September	447 $\frac{1}{2}$	460	97.2
October	375	460	81.5
November	436	460	94.8
December	460 $\frac{1}{2}$	453	101.5

$\frac{1}{2}$  Production forecast based on integrated mail and interview samples.

The estimates from the Survey are erratic because of the small size of the sample for the non-respondent list. In general, the number responding was less than 50 and many of these no longer grew cotton. During September and December when non-respondents were interviewed the sample size was more nearly adequate.

- Locality Data -

Locality data, similar to that obtained from the Regular List of Crop Reporters, were obtained for August through December. The results indicate that the respondents from a probability sample report locality data about the same as respondents on the Regular List. However, neither group of respondents was, in general, representative of the non-respondents. It also indicates that farmers "not growing cotton" should not be asked for locality reports on the crop.

With regard to the locality questions, several other important differences were noted. The locality yield for even the unbiased sample average (i.e., combined mail and interview average) was considerably above the Board's figure. However, the derived yield for individual farms (i.e., production divided by harvested acres) was in good agreement with the Board's yield. The per cent of acreage abandonment for the mail surveys differed appreciably from the integrated or unbiased average. This difference was due in a large part to reporting errors by farmers and should not be asked on questionnaires in the future. It would be preferable to ask acreage planted and harvested and obtain a derived percentage abandonment.

- Non-Respondent Interviews -

Non-response to the mail surveys resulted from a variety of the usual causes. Many farmers who were on the FMA list because they were given cotton allotments in 1950 were not growing cotton at all or were growing it

only as a side line. A much higher proportion of farms not growing cotton was encountered among the non-respondents than among respondents. Respondents also had larger acreages of cotton per farm. In some cases large farms were non-respondents because those operations were so large that the questionnaires never reached the person who actually was operating the farm; it went to an absentee owner who did not bother to forward it to the proper person. Or, these owners had a number of different farm units and were not sure whether a report was wanted for one of his several farm units, or all units combined.

In these surveys non-response had only a slight effect on the results because the ratio method of estimating eliminated the effect of bias. In some instances including data from the samples of non-respondents actually seemed to distort the results instead of improving them because of the small sample size and quality (or type) of data reported. But it should be emphasized that the good showing made by the mail returns alone is due largely to the fact that farmers who were out of the cotton business had been out for several years; if there had been a sudden shift out of cotton this year, the picture would be different.

- Costs of Enumerative Surveys -

The cost data of some of the most pertinent items are given in Table 3. In general, the surveys indicate that (1) the greater the number of schedules per enumerator, the smaller the per schedule cost, (2) the enumerators with previous experience have lower per schedule costs than new enumerators, and (3) the enumerators spent about 3/4 of their time locating and contacting the farmer and only 1/4 of their time obtaining information or data to be recorded on the schedule. It would have been desirable to have spent more time obtaining information about cotton or to have included questions on other crops. Perhaps having the enumerator spend as much as one-half of his time obtaining farm or crop information would seem preferable.

Table 3 - Cost of Enumerative Surveys - 1953 -

ITEM	JULY	SEPTEMBER	DECEMBER
1.Number usable schedules	525	152	143
2.Number of Interviewers	17	16	15
3.Number of schedules per 8-hour day per interviewer	3.7	3.1	3.1
4.Average number miles per schedule	30	40	42
5.Interviewer salary cost per schedule	\$ 3.04	\$ 3.70	\$ 3.69
6.Interviewer mileage cost per schedule	\$ 2.10	\$ 2.82	\$ 2.95
7.Interviewer per diem cost per schedule	-	-	-
8.Interviewer cost per schedule (salary, mileage, per diem)	\$ 5.14	\$ 6.52	\$ 6.64
9.Number of counties included	74	54	49
10.Total interviewer cost for survey	\$2699.78	\$990.95	\$949.65

- Conclusion -

The results of this work indicate that FMA lists of cotton growers provide a workable basis for putting our mail cotton surveys on a sounder footing free from many of the objections which are raised against the selective samples currently in use. Unless radical changes take place in the cotton growing picture, interviews on samples of non-respondents can probably be eliminated without much risk of biasing the results. The most pressing need that the work has brought to light is a thorough revision of the questionnaires so that data on farm land and cropland for the farm covered by the report are properly taken into account so the unit being sampled can be identified. This requires the addition of some questions which will give a true picture of how much land is actually in the "farm" as it is being operated and how much of that land is in cotton. At present there is too much guess-work in interpreting the reported data.

It is recommended that the findings of this study be put to use in our regular operations by:

1. Drawing an objective sample of farms from the 1953 FMA lists throughout the cotton belt.
2. Designing a set of questionnaires which are adapted to making direct expansions of reported data.
3. Conducting mail surveys according to the regular timetable and making direct expansions of the sample data, using the previous year's production as the expansion factor for acreage and production.
4. Using a sub-sample of perhaps 1000 non-respondents to the June acreage schedule over the entire cotton belt to measure the possible extent of bias and need for follow-up work.
5. Using a more objective and uniform procedure for locating fields and sample units within fields for boll count and weevil surveys that are a part of our regular work.

With such a program in operation, samples of non-respondents could be visited to the extent necessary in critical years and provide a basis for knowing how constant the bias in our mail surveys is from year to year. When provision is made for non-respondent interviews, farm land or cropland may be preferable as an expansion base because of memory lapses with respect to "last year's production" or farm operations. When non-respondents are not interviewed, "last year's production" should be a better basis for expansion because it makes allowance for under-representation of small cotton growers.

It is believed that questions relating to prospective yield can be improved. The present study was not designed to investigate this aspect of the problem. However, locality data and questions on the December Survey



asking for changes in yield prospects indicate that information such as weather during the past month, stage of maturity of the crop and cultural practices might be useful in improving our early forecasts of yield.

A study of the month-to-month composition of mail returns may be fruitful for revisions or late season estimates in adjusting mail returns from a probability or cross-section sample for response selectivity. This possibility would appear to be greater for crops other than cotton that do not have good production or ginning data available for adjusting a mail sample for bias due to sample selectivity. The application of Hendrick's "resistance" technique in repeated mailings may be practical. The measure of "resistance" being determined by the number of different months required to obtain a response by mail rather than the number of different mailings to obtain a reply to a single or individual monthly survey. Further investigation with the "resistance" and similar techniques would appear desirable where representative lists are available.

The recommendations based upon the findings of these experimental surveys provide an inexpensive means of putting our State and National cotton estimates on a sounder footing. While it must be recognized that these recommendations may provide only a short-run solution (say the next 3 years) for the cotton estimates, it is imperative that improvements be made wherever possible. The purchase of a certain amount of short-run or "term insurance" is often appropriate, especially since it does not seem feasible to develop a general approach for a number of crops or livestock items without considerable experimental work. Because of cost considerations, area or onumerative sampling requires a multiple crop approach. However, there are several fundamental problems in connection with area sampling which need to be answered: (1) Are the cluster or segment sizes developed primarily for the Middle-West efficient for the South and West?; and (2) What is the best farm unit for repeated sampling by mail and personal interviews? These questions present formidable research problems. Consideration of non-sampling errors, length of questionnaire, and costs may dictate the use of such techniques as the crop meter or point sampling in many states.

With an additional annual expenditure of, say, \$10,000, the survey findings could be put into effect. It would be preferable that this additional money and work be considered as a part of the regular operating program rather than the research program. It must be recognized that some States may have to give up something, probably selective lists, since few States can afford to carry a double load even if it is only for the cotton estimates.

SUMMARY OF MONTHLY SURVEYS

- July Acreage Survey -

The list was composed of 5616 farms. Each farm was mailed a questionnaire on June 19, on June 29 a second schedule was mailed to all those not responding, and on July 7 a third mailing was made to those who had not responded to either of the first two requests. On July 17 a systematic sample of about 600 farms was drawn from the 3,134 farms not responding to any of the three mailed requests. Of these every 10th farm was designated an alternate to be used if the enumerator could not contact the designated farms after two visits. Tables 4 and 5 below show some of the pertinent information on the 1950 allotment data and response rates for the mail surveys along with similar data for the non-respondents.

Table 4 - Cotton Allotment and Contract Data for the Mail and Interview Phases

Item	Population	Sample			
	State N. C.	Mailing List	Mail Rets.	Non-Respondents	Interviewed Non-Respondents
Allotted Acres	748,824	40,668	17,050	23,618	3,352
Number Contracts	112,735	5,616	2,482	3,134	525
Acres per Contract	6.6	7.2	6.9	7.5	6.4

Table 5 - Percentage Returns and Number Farms Reporting No Cotton in 1953 for Mail and Interview Samples

Item	Mail Returns				Non-Respondents
	1st Mailing	2nd Mailing	3rd Mailing	Total Three Mailings	
Beginning Date	June 19	June 29	July 7	-	July 20
Percent Total	12.9	20.6	10.7	44.2	55.8
Percent Reporting Zero Cotton Acres				8.3	39.4

Table 4 reveals that the list of farms received from FMA constituted about 5.4% of the allotments and the average size of the allotment per contract was about 9% larger than for the population as a whole. In addition, the average allotment size for the mail returns was about 9% smaller than for the non-respondent segment. However, the interviewed non-respondents were smaller on the average than any of the other segments. This appears to be the result of not having picked a few of the very big allotments in our sample of the non-respondents. From Table 5 we also note the very large percent of farms among the non-respondents reporting no cotton in 1953. Of those farms interviewed about 40 percent reported no cotton in 1953 as compared to only 8% for those reporting by mail. The largest percent of mail returns was obtained for the second mailing which seems to be fairly typical of results obtained in connection with other mail surveys.

Table 6 - Reasons given by Farmers for Not Returning Questionnaire by Mail  
(Groupings Made After Enumeration)

Reasons	Number
Lack of Interest	477
A. No Cotton	85
B. No Special Reason	285
C. No Interest	<u>107</u> <u>477</u>
Unable to Understand Questionnaire	23
Schedule Not Received	12
Reluctant to Answer Any Questionnaire	8
Suspect Some Connection with 1954 Allotment	5
<b>Total</b>	<b>525</b>

Table 6 reveals overwhelmingly that most growers not responding had very little interest in this survey and is no doubt fairly typical of the results from a random list of growers.

Tables 7 and 8 give the estimates for various items based on the sample expansions.

Table 7 - July 1 Estimates Based on Integrated Mail and Interview Surveys and Related Check Data

Item	Sample Expansions				Check Data	
	Ratio	Ratio	Percent of		Board	Other
	Allotments	Bales	Board			
A	B	A	B	Estimates		
Land in Farm 1953	9,761,136	8,152,201	-	-	-	
Land in Farm 1952	9,709,672	8,109,211	-	-	-	
Planted Acres 1953	891,336	744,416	114.1	95.3	781,000	
Planted Acres 1952	873,586	729,592	114.2	95.4	765,000	
Acres July 1, 1953	883,143	737,574	114.7	95.8	770,000	State Farm
Acres Harvested 1952	858,488	716,933	115.2	96.2	745,000	Census 760,800
Bales Harvested 1952	681,299	-	119.7	-	569,000	

Table 8 - July 1 Estimates Based Only on Mail Survey and Related Check Data

Item	Sample Expansions				Check Data	
	Ratio	Ratio	Percent of		Board	Other
	Allotments	Bales	Board			
A	B	A	B	Estimates		
Land In Farm 1953	8,633,039	7,050,305	-	-	-	
Land in Farm 1952	8,602,735	7,025,557	-	-	-	
Planted Acres 1953	924,678	755,152	-	-	-	
Planted Acres 1952	887,214	724,557	116.0	94.7	765,000	
Acres July 1, 1953	915,496	747,648	118.9	97.1	770,000	State Farm
Acres Harvested 1952	870,656	711,022	116.9	95.4	745,000	Census 760,800
Bales Harvested 1952	696,736	-	122.4	-	569,000	

From the available check data it appears that for all items the Ratio to 1950 allotted acres method of expansion gives results much too high to be accounted for entirely by sampling errors. The estimates based solely on the mail returns are slightly higher still. The notable exception appears to be item Land in Farms. This is probably the result of Cropland being reported for Total Land in Farms on the mail questionnaire since the cropland question was not included in the mail schedule. The Ratio to 1952 Bales method of expansion appears to give usable results in line with the check data. In general one cannot detect any improvement in the integrated estimate over that based solely upon mail returns. However, the Ratio to 1952 Bales gives results slightly under the Board Estimates in all cases suggesting there may be a small downward bias in this estimating procedure, or that the Board Estimates might possibly be too high. The fact that the interviewing of non-respondents does not improve the estimates is indeed surprising. If this is typical for cotton, then there is considerable question as to whether the additional cost of interviewing non-respondents is justified.

#### A. - Farmers' Concepts in Reporting Rented Land

From the questionnaire used in the enumeration of non-respondents the section on rented land reveals most farmers think of land rented from others as part of their operating unit. Also, most respondents tended to include the cotton on land rented from others in their reported cotton acreage. Those who do not think of rented land as part of their farm likewise probably will not include the cotton acreage on such land in their total cotton acreage. While this appears to be the situation in general, the proportion not following this general pattern may be sufficient to introduce some definite biases into the farm size and any relationship of cotton acres to farm size. About 14% indicate they do not include land rented from others in their farm size and another 14% of those who do include it in farm size may not include their cotton acreage.

Farmers renting land to others likewise tended to think of such land as included in their farm size and most of them included the cotton acres on such land in their reported acres. However, farmers not including such land in their farm size still tended to include the cotton acres on such land in their reported cotton acreage. The fact that land rented out and cotton on such land are included in the farmer's reported farm data may introduce a definite bias into either the estimating procedure or the relationship between the size of operating units and cotton acreage, or the 1950 cotton allotments and the 1953 cotton acreage. That is, such a report covers two or more operating units. For farmers reporting land rented from others, the reported farm size was 119 acres while a derived farm size based on reported acres owned minus land rented out plus land rented from others gives an average of 103 acres. Farmers Renting Land to Others reported an average farm size of 146 acres with a derived farm size of 93 acres indicating approximately 1-1/2 operating units rather than 2 or more units. Thus the original correction for multiple contracts was probably not enough for this group. It is thought that the reason this

adjustment did not eliminate all the bias was because tenant operating units are probably smaller on the average than those operated by land owners. In addition, the ratio of cotton acreage to total farm land is greater for tenant farms because tenant farms (or operating units) consist almost entirely of cropland.

The tabulation and farm size averages suggest that more meaningful results and a better relationship between the operating unit and cotton acreage would be obtained if we determined for land rented from others and to others the corresponding number of cotton acres. Or, perhaps a more practical procedure would be to determine the total acres of all land and cotton acreage being tended by the owner and also by the tenants operating on his land, since allotments appear to have been assigned on such a basis.

Table 9 below summarizes the information on land rented from others and to others for farms reporting cotton.

Table 9 - Farmers Reporting Cotton Acreage and Rented Land on the July Non-Respondent Interviews

How land was reported by Farmer	Land Rented In	Land Rented Out
	Number	Number
Included such land in farm size	72	108
Also included cotton acreage on that land	62	95
Did not include cotton acreage on that land	1	7
Question not ascertained by enumerator	9	6
Reported Tenants or Croppers on Farm	34	101
Excluded such land from farm size	13	19
But, included cotton acreage on that land	5	17
Did not include cotton acreage on that land	8	1
Question not ascertained by enumerator	0	1
Reported Tenants or Croppers on Farm	5	19
TOTAL	85	127

B. - Reasons for Over-Expansion by Ratio to Allotment

The over-expansion was probably the result of a different unit being reported than that for which we had allotment data. The reason for this difference in the reported unit appears to be the result of those farms possessing multiple contracts in 1950. The designation of multiple contracts for farms in 1950 appears to have been fairly closely tied to the number of tenant farms. Each tenant farm received a contract and allotment in the owner's name, in most cases. The July questionnaires were sent to the owners and as a result the data for the survey was reported by the owner

for his total land including the tenant farms as well as his own operating unit in many instances. While it is believed the use of change in farm size to correct for this may be a useful procedure as was originally done, this correction was probably not sufficient because tenant farms are smaller on the average than the owner-operated farms. For this reason ratio of the 1950 farm size to 1953 reported farm size for those showing larger farms may be a better method of adjusting for this change in unit.

However, I also obtained the rather distinct impression from my field travel that most of the farmers thought we might have some indirect connection with an anticipated control program or be checking for PMA. This undoubtedly also resulted in some upward bias in the estimates. Though it seems likely that the ratio to last year's data would have little such bias since such respondents also would report last year's data correspondingly high.

The probably effects of such biases as mentioned above are clearly all in the same direction - upward. If I were to place a figure on the extent of such biases still in the State estimate, I would guess something like 10 percent from the multiple contract factor and 5 percent from conscious over-statement of data. However, we were probably able to take out only about one-half of the bias due to multiple contracts by the original adjustments made using changes in farm size of 50% or more.

Table 10 below shows the State Estimate after adjusting the reported data for those farms showing increases of 10% or more in their farm land from 1950 to 1953 downward by the ratio of 1950 to 1953.

Table 10 - State Estimates Adjusted by Ratio 1950 Farm Land to 1953 Farm Land for Those Farms Reporting Changes of 10% or More In Farm Land from 1950.

ITEM	SAMPLE EXPANSIONS		CHECK DATA	
	Ratio to Allotment	% of Board	Board Estimate	Other
Planted Acres 1953	794,495	-		
Planted Acres 1952	788,476	103.1	765,000	
Acres July 1, 1953	789,869	102.6	770,000	State Farm Census
Acres Harvested 1952	774,128	103.9(101.9)	745,000	760,800
Bales Harvested 1952	613,583	107.8	569,000	

The possibility that some enumerator bias may have been introduced by the selection of alternates might be another source of error of an upward bias. However, the studies made to date do not indicate that this would be a likely source for an upward bias.

Tables 11 and 12 below give some comparative data on non-respondent farms for which schedules were not obtained and on alternate farms which were selected.

Table 11 - Reason Farms Were Not Enumerated -

ENUMERATOR'S REASON	NUMBER FARMS
A. Owner Dead	11
B. Couldn't locate	11
C. Out of town	6
D. Sold farm & moved away	6
E. Roads impassable	2
F. Refusal	2
G. In hospital	1
H. Duplication	1
I. No reason	6
Total	46
Schedule Received Too Late To Tabulate	5
Grant Total	51

Table 12 - Comparative Data for Farms Not Enumerated and Alternates Selected by Enumerators

ITEMS (1950 P. M. A.)	FARMS NOT ENUMERATED*	ALTERNATES SELECTED
Average Land in Farms	86.8 (33.7)	36.1
Average Cropland	14.0 ( 8.6)	5.2
Cotton Allotment	9.6 ( 4.4)	3.6
Number Farms	51 (49 )	37

\* Two large farms dominate averages



- August Survey -

The August Survey of expected 1953 production and locality data was conducted entirely by mail. The list used was derived from the July mail returns and from the July interviews of non-respondents. A systematic sample of about one-half of the farmers returning questionnaires by mail made up the mailing list for a "July Respondent Stratum". All non-respondents interviewed in July made up the mailing list for a "July Non-Respondent Stratum". The questionnaires were mailed on July 25 to this list of farmers. From the list of farmers representing the "Respondent Stratum" we had an August response rate of 22.8 percent while for the "Non-Respondent Stratum" only 7.6 percent of the farmers returned schedules by mail. These response rates suggest that the "non-respondent stratum" left after three mailings in July apparently have so much "resistance" to returning a schedule by mail that only a relatively small percent can be expected to return questionnaires by mail even after they have been interviewed. To some extent this Response rate could probably be increased by better enumerator training and devoting more time to doing a better selling job on the non-respondents. The sampling error associated with the "non-respondent stratum" is obviously too large to place much confidence in the resulting production estimates.

Table 13 below shows some of the pertinent data for the survey.

Table 13 - August 1 Production Estimates -

ITEM	SAMPLE EXPANSIONS			CHECK DATA	
	Ratio Allotment	Ratio Bales	% Board Estimate		Board Estimate
	A	B	A	B	
Bales Harvested 1953	487,000	532,000	105.9	115.7	460,000
Bales Harvested 1952	541,000	-	95.1	-	569,000

For Table 13 the 40 farms responding for the "Non-Respondent Stratum" carry more weight than the 332 responding for the "Respondent Stratum". Studies of costs and variance functions integrating the July and subsequent monthly surveys will need be made to determine how to reallocate our sample so the various monthly surveys will yield the desired reliability.

Table 14 below gives the locality summary data for August. The sample sizes are such that nothing can be concluded with respect to how the inclusion or exclusion of farmers having no cotton would in general affect the average. However, if the response by farmers having no cotton is no greater than for the August Survey, their effect on the averages will be so small that it won't matter how they are handled.

Table 14 - Locality Averages for Farms Growing Cotton and Farms Growing No Cotton in 1953

ITEM	Respondent Stratum		Non-Respondent Stratum		Regular B.A.E. Cotton List
	Cotton	No Cotton	Cotton	No Cotton	
No. Farms	240	12	18	2	421
Condition Aug. 1st (% Normal)	78	81	80	78	79
No. Bolls Safe	5.1	4.4	4.1	0	5.8
Percent Stand	92	89	86	80	91
Yield - Seed Cotton (Lbs)	947	782	997	800	935
Yield - Lint Cotton (Lbs)	352	345	319	350	348
Date 1st Boll Open (July 1 = 1)	52	62	48	1	50(Aug.19)
Weevil Infestation (% usual)	36	33	31	100	35

- September Acreage and Production Survey -

The September Survey was conducted by mail with 150 follow-up interviews with non-respondents. Schedules were mailed on August 24 to the same list of farmers as in August composed of a "July Respondent Stratum" and "July Non-Respondent Stratum". Farmers not returning schedules by mail before September 4 were put in non-respondent sub-strata for the "Respondent" and "Non-Respondent" strata. A systematic sample of 75 non-respondents (with alternates) from each of the sub-strata was selected. A total of 20.5 percent of the farmers returned schedules by mail for the "Respondent Stratum" as compared to 8.0 percent for the "Non-Respondent Stratum".

Table 15 - September 1 Production and Acreage Estimates for the Integrated Mail and Interview Data -

ITEM	SAMPLE EXPANSIONS				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board		Board Estimate
	A	B	A	B	
Acres Planted 1953	869,000	739,000	111.7	95.0	778,000
Acres Harvested 1953	857,000	729,000	112.5	95.7	762,000
Bales Harvested 1953	528,000	447,000	114.8	97.2	460,000
Bales Harvested 1952	675,000	-	118.6	-	569,000

The State Estimates for September are in good agreement with the corresponding estimates for July. The ratio to allotment expansion is much too high compared to the Board Estimate as in July. The ratio to 1952 Production expansion agrees reasonably well with the Board Estimate though all are slightly lower in July. Expansions based solely on the mail returns appear to give results within a range which can probably be accounted for by sampling fluctuations for the ratio to 1952 Production method. The ratio allotment expansion is again much too high to attribute entirely to sampling error.

Table 16 - September 1 Production and Acreage Estimates Based Only on the Mail Returns -

ITEM	SAMPLE EXPANSION				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board		Board Estimate
	A	B	A	B	
Acres Planted 1953	1,012,000	716,000	130.1	92.0	778,000
Acres Harvested 1953	1,005,000	710,000	131.9	93.2	762,000
Bales Harvested 1953	647,000	447,000	140.7	97.2	460,000
Bales Harvested 1952	829,000	-	145.7	-	569,000

Table 17 - Locality Averages for Farms Growing Cotton and Farms Growing No Cotton in 1953 -

ITEM	RESPONDENT STRATA				NON-RESPONDENT STRATA				Regular B.A.E. Cotton List
	Cotton		No Cotton		Cotton		No Cotton		
	Mail	Interview	Mail	Intv.	Mail	Interview	Mail	Intv.	
No. Farms Reporting Condition	184	54	13	18	17	46	2	22	418
Sept. 1	76	63	69	73	67	65	65	66	70
Percent Abandoned	3.7	0.6	9.3	0.1	0.1	0.2	50.0	0.9	1.2
Bolls Safe	9.2	9.6	8.2	10.0	7.6	10.3	-	10.2	9.4
Yield - Seed Cotton	849	853	825	819	769	831	675	795	826
Yield Lint Cotton	316	303	291	292	252	311	225	293	310
Size Bolls % Normal	81	82	75	76	75	74	80	74	79
Boll Weevil Infestation %	39.8	27.9	25.8	26.1	37.8	27.0	30.0	30.0	39.0

- October Survey -

The October Survey was similar to the August Survey with production and locality data being obtained entirely from a mail sample. The list was the same as used in August. That is., schedules were mailed to the 1453 names on the "M" or July Respondent list and the 525 on the "I" list or non-respondents interviewed in July. The response rate was 19.6 percent for the "M" list and 8.4 percent for the "I" list. The production estimates are shown in Table 18.

Table 18 - October 1 Production Estimates -

ITEM	SAMPLE EXPANSIONS				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board Estimate		Board Estimate
	A	B	A	B	
Bales Harvested 1953	514,000	375,000	111.7	81.5	460,000
Bales Harvested 1952	778,000	-	136.7	-	569,000

A large portion of the differences between the Survey results and the Board Estimate is believed to be attributed to sampling error since the 44 returns for the "I" list carry more weight than the 285 returns from the "M" list.

The locality data on the October Survey are given below along with the Regular List averages.

Table 19 - Locality Averages October 1 -

ITEM	July Respondent Stratum	July Non-Respondent Stratum	Regular B.A.E. Cotton List
No. Farms Reporting	285	44	417
Condition (% Normal)	67.6	66.7	68
No. Bolls Safe	8.2	9.6	9.0
Yield - Seed Cotton (Lbs.)	764	652	821
Yield - Lint Cotton (Lbs.)	294	265	302

Those farmers not growing cotton were not tabulated separately because of the small number reporting on locality data.

- November Survey

The survey was again conducted entirely by mail with 20.7 percent returning schedules from the "M" list and 7.6 percent from the "I" list. The production estimates are given in Table 20.

Table 20 - November 1 Production Estimates -

ITEM	SAMPLE EXPANSIONS				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board Estimate		Board Estimate
	A	B	A	B	
Bales Harvested 1953	534,000	436,000	116.1	94.8	460,000
Bales Harvested 1952	697,000	-	122.5	-	569,000

The locality averages are given in Table 21.

Table 21 - Locality Average November 1 -

ITEM	July Respondent Stratum	July Non-Respondent Stratum	Regular B.A.E. Cotton List
No. Farms Reporting	301	40	498
Condition (% Normal)	67.7	65.2	70
No. Bolls Safe	9.4	7.7	9.4
Yield - Seed Cotton	833	731	853
Yield - Lint Cotton	301	269	312
Av. Price Hand Picking (100#)	3.25	3.17	3.34
Av. Price Hand Snap (100#)	3.24	2.59	2.40
Av. Wt. Balo (Lbs)	478	472	490

- December Acreage and Production Survey -

The December Survey was conducted by mail with approximately 150 follow-up interviews with non-respondents. Farmers not returning schedules by mail were put in non-respondent sub-strata for both the "M" and "I" lists as was done in September. A sample of 75 non-respondents from each sub-strata was drawn. The response to the mail survey was 18.9 percent for the "M" list and 6.3 percent for the "I" list. In addition, 31 interviews were obtained with growers whose mail reports in December differed significantly in acreage or production from their earlier reports in an effort to determine the reason for these differences. Those non-respondent growers selected for the inter-

view sample were not interviewed if they had previously indicated no cotton was grown; instead, "dummy" schedules containing the pertinent data obtained in July were made up and used for the acreage and production information.

The acreage and production estimates are shown in Table 22.

Table 22 - December 1 Acreage and Production Estimates for Integrated Mail and Interview Sample -

ITEM	SAMPLE EXPANSIONS				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board Estimate		Board Estimate
	A	B	A	B	
Acres Planted 1953	990,000	797,000	126.8	102.0	781,000
Acres Harvested 1953	973,000	783,000	125.5	101.0	775,000
Bales Produced 1953	572,000	460,000	126.3	101.5	453,000
Bales Produced 1952	707,000	-	124.3	-	569,000

The acreage and production estimates based on only the mail returns are shown in Table 23.

Table 23 - December 1 Acreage and Production Estimates Based Only on Mail Returns -

ITEM	SAMPLE EXPANSIONS				CHECK DATA
	Ratio Allotment	Ratio Bales	% Board Estimates		Board Estimate
	A	B	A	B	
Acres Planted 1953	858,000	795,000	109.9	101.8	781,000
Acres Harvested 1953	799,000	740,000	103.1	95.5	775,000
Bales Produced 1953	479,000	444,000	105.7	98.0	453,000
Bales Produced 1952	614,000	-	107.9	-	569,000

The locality data from the Survey compared with the Regular List are shown in Table 24.

Table 24 - Locality Averages Dec. 1 -

ITEM	July Respondent Strata		July Non-Respondent Strata		Regular B.A.E. Cotton List
	Mail	Interview	Mail	Interview	
No. Farms Reporting	275	73	33	79	599
Abandonment %	9.4	0.6	5.2	0.6	0.8
Yield - Seed Cotton (Lbs)	820	837	638	820	847
Yield - Lint Cotton (Lbs)	305	306	253	306	313

The December interview or non-respondent questionnaire also contained questions designed to indicate the extent and reasons for significant changes in the items "land in farm", "acres for harvest" and "bales expected" from the growers previous report. The summary for the item "land in farm" is given in Table 25.

Table 25 - Land in Farm in December Different from July -

REASON	"M" - List			"I" - List		
	No. Repts.	Dec. Acres	July Acres	No. Repts.	Dec. Acres	July Acres
1. Reported cropland only in July	9	1217	764	3	1020	656
2. Operates more than one farm (or contract)	3	578	336	2	868	561
3. Did not include rented land	0	-	-	0	-	-
4. Changed farm size (bought, moved, etc.)	1	244	105	1	215	222
5. Miscellaneous	3	140	136	3	381	206
Sub Total - Farms showing changes	15	2179	1341	9	2484	1645
Total* - All Farms	63	6212	5808	50	8415	7567

\* Excludes farms reporting zero cotton acres in July.

The land in farm item was under-reported in July for both the "M" and "I" lists. However, the frequency of under-reporting for reason #1 was apparently greater for the July mail questionnaire than for the Non-respondent questionnaire which included the cropland question.

Similar comparisons are given for the items "acres for harvest" and "Bales expected" in Tables 26 and 27.

Table 26-Acres Cotton Harvested December Different from September -

REASON	"M" - LIST			"I" - LIST		
	No. Rpts.	Dec. Acres	Sept. Acres	No. Rpts.	Dec. Acres	Sept. Acres
1. Measured acres different from Sept.	4	56.0	44.5	1	2.0	1.7
2. Operates more than one farm	1	50.0	23.0	1	428.3	400.0
3. Abandonment different from Sept.	0	-	-	1	2.0	0.0
4. Rented land not included	0	-	-	1	11.7	20.0
5. Miscellaneous	1	10.1	15.0	2	5.5	4.0
Sub-Total-Farms Showing Changes	6	116.1	82.5	6	449.5	425.7
Total-Farms* Reporting both Months	8	241.1	207.5	15	582.2	558.4

\* Excludes farms reporting zero cotton acres in July.

Table 27 - December Production Different from Earlier Month -

PRODUCTION GREATER IN DECEMBER THAN				PRODUCTION LESS IN DECEMBER THAN			
REASON	Frequency Reported			REASON	Frequency Reported 1/		
	Oct	Sept	Aug		Oct	Sept	Aug
1. Rain when needed.	0	0	1	1. Drought	4	12	6
2. Late cotton made good crop.	0	1	0	2. Heavy weevil damage.	4	10	5
3. Under-estimated	5	2	0	3. Over-estimated.	0	0	0
4. Miscellaneous	0	2	0	4. Miscellaneous.	0	2	1
5. Report for different unit.	1	1	0	5. Report for different unit.	0	0	0
TOTAL	6	6	1	TOTAL	8	24	12
Farms Reporting Both Months 2/	6	6	1	Farms Reporting Both Months	4	14	7

1/More than one reason may have been given for differences.

2/No farm is included in more than one month, i.e., comparisons are independent from month-to-month.



The comparisons between December and the various months are based upon a very small number of farms which necessarily makes any inferences highly speculative. Table 26 suggests that these farmers tended to include more cotton acreage in their report in December than September and FMA measurements may have been an important influence. Table 27 suggests that those farmers who report greater production in December tended to feel they underestimated the crop earlier. Those who reported less production in December tended to blame it on the dry weather and the weevil. However, the reasons for the underestimation (reason #3) by growers needs further investigation if much light is to be shed upon this type of difference. If those reasons are the correct ones, then the utilization of objective measurements and weather data into the estimating procedure needs more emphasis in the forecasting of yields.

One additional observation is of interest in connection with month-to-month comparisons. The composition of the mail returns from month-to-month seemed to change materially. That is, a number of new farms tended to report each month. This suggests the possibility of increasing the effective sample size in the later months.

The summary of the 31 special interviews with December respondents whose reports showed significant changes in acreage or production from a previous month indicates:

1. These farmers reported their harvested acreage slightly higher in September than in December.
2. These farmers expected somewhat higher production in August and September than they did in December. However, their indicated production in December was about the same as they expected in October.

In addition, a question on the number of FIA contracts covering the current farm operation was included on the schedule. In general, the comparison of the number of contracts and the adjustment factors derived from changes in farm land indicated that: the original adjustments tended to over-correct on the basis of total number of contracts, but the correction for cotton acreage was too small. It is thought that the reason for the under-correction of cotton acreage was that changes in farm land is not a reliable measure of contract numbers for large farms.