Report of the
Holly Springs Branch
Experiment Station, 1931

* * *

BY

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A. & M. College, Mississippi
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Most of the experimental work treated in this report was begun in previous years. Special emphasis was given to cotton production with some work devoted to legumes and grains. Over twelve hundred experimental plots were used, five hundred dealing with soils and fertilizers and seven hundred dealing with crops and cultural methods.

Studies in soil erosion are in co-operation with the United States Department of Agriculture through the Southern Forest Experiment Station, New Orleans, Louisiana. The factors affecting soil erosion and the best method of its control are to be determined.

The work of this station was designed solely to assist the farmers in solving their farm problems, not to make money. The station can best serve the farmers if they visit the station frequently to inspect the work and discuss their problems. Several thousand visitors came to the station this year. On Field Day alone, September 17, there were about eleven hundred visitors present.

Seasonal conditions were not ideal for maximum crop yields. Abundant rainfall in April and May was conducive to excessive stalk development and the droughty condition during June and July caused cotton to shed considerably. Corn, sorghum, and soybean yields were highly satisfactory both for silage and grain. The light infestation of boll weevil in June was checked by the extremely dry weather. The cotton hopper destroyed all but the top crop on the rank valley cotton, designated as the Valley Varieties and Valley Fertilizer tests. Sorghum midge destroyed almost the entire crop of grohoma and atlas sorgo while adjoining plots of sagrain and Japanese seed-ed ribbon cane were slightly affected.

Cotton Varieties

The purpose of this test is to determine the varieties of cotton that are most productive and best adapted to the soil and climate of this section.

Cotton variety tests were conducted on both the hill and valley lands. Each variety was planted in single rows in four replications. Accurate weights of seed cotton were secured on each row at harvest time. One hundred boll samples were picked to ascertain yield, lint percentage, staple, and boll size. The

*Mr. T. F. McGhee, Assistant Director in Charge from September 1, 1930, to September 1, 1931.
value of lint in cents per pound was determined for each variety from the average value of its staple over a period of time as quoted by the leading cotton markets. Seed was valued at ten dollars per ton. The data from the Hill and the Valley Land tests are given in Table 1 as three and five-year averages. The

Table 1

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Hill Cotton Variety</th>
<th>Valley Cotton Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average 1929-31</td>
<td>Average 1926-31</td>
</tr>
<tr>
<td></td>
<td>Lb. lint per acre</td>
<td>Value per acre</td>
</tr>
<tr>
<td>Stoneville 3</td>
<td>566</td>
<td>72.93</td>
</tr>
<tr>
<td>Missdel. 2</td>
<td>530</td>
<td>67.93</td>
</tr>
<tr>
<td>Stoneville 2</td>
<td>503</td>
<td>64.83</td>
</tr>
<tr>
<td>D. &amp; P. L. 4-8</td>
<td>449</td>
<td>60.25</td>
</tr>
<tr>
<td>Lightning Express</td>
<td>419</td>
<td>58.82</td>
</tr>
<tr>
<td>Lone Star 561</td>
<td>446</td>
<td>58.28</td>
</tr>
<tr>
<td>Missdel 1</td>
<td>429</td>
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</tr>
<tr>
<td>Cleveland 54</td>
<td>459</td>
<td>58.05</td>
</tr>
<tr>
<td>Deltatype Webber</td>
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<td>57.15</td>
</tr>
<tr>
<td>Cleveland Wilson</td>
<td>468</td>
<td>56.96</td>
</tr>
<tr>
<td>Half &amp; Half</td>
<td>522</td>
<td>55.58</td>
</tr>
<tr>
<td>Miller 589</td>
<td>355</td>
<td>55.16</td>
</tr>
<tr>
<td>Acala</td>
<td>392</td>
<td>54.23</td>
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<tr>
<td>Cleveland Piedmont</td>
<td>431</td>
<td>52.88</td>
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Table 2

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Lb. lint per acre</th>
<th>Per cent lint</th>
<th>Staple</th>
<th>Cents per lb.</th>
<th>Value per acre</th>
<th>Bolls per lb.</th>
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<tr>
<td>Missdel 2</td>
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<td>1 3/32</td>
<td>6.90</td>
<td>54.98</td>
<td>81</td>
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<td>Delfos 531</td>
<td>600</td>
<td>31.0</td>
<td>1 1/8</td>
<td>7.35</td>
<td>50.75</td>
<td>78</td>
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<tr>
<td>Missdel 1</td>
<td>503</td>
<td>30.7</td>
<td>1 3/32</td>
<td>6.90</td>
<td>40.39</td>
<td>68</td>
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<td>1</td>
<td>6.10</td>
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<td>71</td>
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<tr>
<td>Stoneville 3</td>
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<td>31/32</td>
<td>5.90</td>
<td>31.88</td>
<td>73</td>
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<td>Lone Star 562</td>
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<td>1</td>
<td>6.10</td>
<td>29.61</td>
<td>65</td>
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<tr>
<td>Light. Express</td>
<td>359</td>
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<td>1</td>
<td>6.90</td>
<td>29.10</td>
<td>72</td>
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<tr>
<td>Farm Relief</td>
<td>361</td>
<td>31.9</td>
<td>1 3/32</td>
<td>6.90</td>
<td>28.78</td>
<td>61</td>
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<tr>
<td>Cleveland 884-4</td>
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<td>1</td>
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<td>28.46</td>
<td>65</td>
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<tr>
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<td>297</td>
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<td>8.30</td>
<td>27.97</td>
<td>64</td>
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<tr>
<td>D. &amp; P. L. 10</td>
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<td>31/32</td>
<td>5.90</td>
<td>25.51</td>
<td>78</td>
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<tr>
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<td>23/24</td>
<td>5.85</td>
<td>22.68</td>
<td>69</td>
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<tr>
<td>D. &amp; P. L. 4-8</td>
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<td>34.6</td>
<td>31/32</td>
<td>5.90</td>
<td>21.85</td>
<td>71</td>
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<tr>
<td>Acala 37</td>
<td>284</td>
<td>32.5</td>
<td>1</td>
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<td>20.28</td>
<td>68</td>
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<tr>
<td>Rowden 2088</td>
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<td>31/32</td>
<td>5.90</td>
<td>20.28</td>
<td>59</td>
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<tr>
<td>Lone Star 561</td>
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<td>1</td>
<td>6.10</td>
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<td>63</td>
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<td>Wilson Type</td>
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<td>29/32</td>
<td>5.60</td>
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<td>70</td>
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<tr>
<td>Express 17</td>
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<td>6.65</td>
<td>17.84</td>
<td>71</td>
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<tr>
<td>Cleveland Piedmont</td>
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<td>7/8</td>
<td>5.50</td>
<td>15.63</td>
<td>68</td>
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<tr>
<td>Half &amp; Half—Mahon</td>
<td>318</td>
<td>34.6</td>
<td>27/32</td>
<td>4.00</td>
<td>15.60</td>
<td>65</td>
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<tr>
<td>Miller 610</td>
<td>202</td>
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<td>14.43</td>
<td>56</td>
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<tr>
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<td>1</td>
<td>6.10</td>
<td>13.53</td>
<td>60</td>
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### Table 3

Main Variety Test—Hill

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Lbs. lint per acre</th>
<th>Per cent lint</th>
<th>Staple</th>
<th>Cents per lb.</th>
<th>Value per acre</th>
<th>Bolls per lb.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
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<td>79.15</td>
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<td>1</td>
<td>3/32</td>
<td>6.90</td>
<td>69.38</td>
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<td>56.41</td>
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<td>35.3</td>
<td>1</td>
<td>3/32</td>
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<td>48.72</td>
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<tr>
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<td>577</td>
<td>33.6</td>
<td>1</td>
<td>1/8</td>
<td>7.35</td>
<td>48.12</td>
</tr>
<tr>
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<td>1</td>
<td>31/32</td>
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<td>1/16</td>
<td>6.65</td>
<td>43.88</td>
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<td>Cleveland 54</td>
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<td>15/16</td>
<td>5.75</td>
<td>39.92</td>
<td></td>
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<tr>
<td>Farm Relief</td>
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<td>1</td>
<td>1/16</td>
<td>6.65</td>
<td>39.66</td>
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<tr>
<td>Cleveland Piedmont</td>
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<td>7/8</td>
<td>5.50</td>
<td>36.05</td>
<td></td>
</tr>
<tr>
<td>D. &amp; P. L. 4-8</td>
<td>522</td>
<td>39.4</td>
<td>15/16</td>
<td>5.75</td>
<td>34.04</td>
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<tr>
<td>Acala 37</td>
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<td>34.0</td>
<td>1</td>
<td></td>
<td>6.10</td>
<td>32.77</td>
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<tr>
<td>Express 17</td>
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<td>1/16</td>
<td>6.65</td>
<td>32.23</td>
</tr>
<tr>
<td>Half &amp; Half—Mahon</td>
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<td>40.3</td>
<td>27/32</td>
<td>4.00</td>
<td>29.92</td>
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<tr>
<td>Rowden 2088</td>
<td>351</td>
<td>34.2</td>
<td>31/32</td>
<td>6.30</td>
<td>24.07</td>
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<tr>
<td>Miller 589</td>
<td>250</td>
<td>36.3</td>
<td>31/32</td>
<td>5.90</td>
<td>18.93</td>
<td></td>
</tr>
<tr>
<td>Miller 610</td>
<td>230</td>
<td>37.8</td>
<td>1</td>
<td></td>
<td>6.10</td>
<td>15.94</td>
</tr>
</tbody>
</table>

Hill test received 700 pounds of 4-8-8 fertilizer per acre, and the Valley test 600 pounds.

**Nitrogen Sources Test**

The purpose of this test it to determine the relative efficiency of the various sources of nitrogen in cotton production. The test was conducted on a uniform unimproved brown loam.

### Table 4

Main Nitrogen Sources Test with Cotton

<table>
<thead>
<tr>
<th>Nitrogen sources</th>
<th>Average 1929-31</th>
<th>1931</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acre yield</td>
<td>No nitrogen check</td>
</tr>
<tr>
<td>Leunasalpeter</td>
<td>829</td>
<td>309</td>
</tr>
<tr>
<td>Nitrate soda</td>
<td>829</td>
<td>313</td>
</tr>
<tr>
<td>Cal-Nitro</td>
<td>811</td>
<td>304</td>
</tr>
<tr>
<td>Ammonium sulphate</td>
<td>859</td>
<td>375</td>
</tr>
<tr>
<td>Calurea</td>
<td>808</td>
<td>354</td>
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<tr>
<td>Calcium nitrate</td>
<td>763</td>
<td>354</td>
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<tr>
<td>Cyanamid</td>
<td>738</td>
<td>334</td>
</tr>
<tr>
<td>Ammonium nitrate 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amm. Sul. &amp; Nit. Soda 2</td>
<td>776</td>
<td>412</td>
</tr>
<tr>
<td>No fertilizer</td>
<td>307</td>
<td>271</td>
</tr>
<tr>
<td>No nitrogen</td>
<td>313</td>
<td>313</td>
</tr>
</tbody>
</table>

1. One year (1931)
2. Two years (1929-30)

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4
soil which had been continuously cropped to cotton for 75 years or more. All plots were one-twentieth acre in size, composed of four rows, and repeated three times.

A uniform application of 600 pounds of 0-12-6 fertilizer was made to all except the no fertilizer plots, and 36 pounds per acre of nitrogen from the various sources applied to the respective plots. The combination, ammonium sulfate-nitrate of soda application was discontinued this year and ammonium nitrate-calcium carbonate substituted. The data are given in Table 4 as one and three-year averages and arranged according to the three-year average yield.

Secondary Nitrogen Sources Test
The Secondary Nitrogen Sources test was conducted under the same conditions as the Main Nitrogen Sources test. Results for one year only are presented. The 1930 results were unsatisfactory due to poor stands and late plantings.

<table>
<thead>
<tr>
<th>Nitrogen sources</th>
<th>Acre yield</th>
<th>No nitrogen check</th>
<th>Increase</th>
<th>Bolls per lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcadian nitrate soda</td>
<td>640</td>
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<td>372</td>
<td>76.1</td>
</tr>
<tr>
<td>Chilean nitrate soda</td>
<td>572</td>
<td>284</td>
<td>288</td>
<td>77.9</td>
</tr>
<tr>
<td>Urea</td>
<td>544</td>
<td>272</td>
<td>272</td>
<td>76.0</td>
</tr>
<tr>
<td>Ammonium nitrate</td>
<td>476</td>
<td>245</td>
<td>231</td>
<td>78.8</td>
</tr>
<tr>
<td>Cal-Nitro</td>
<td>459</td>
<td>249</td>
<td>210</td>
<td>76.4</td>
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<tr>
<td>Cottonseed meal</td>
<td>448</td>
<td>265</td>
<td>183</td>
<td>78.4</td>
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<tr>
<td>Nitrophoska (12-24-12)</td>
<td>433</td>
<td>257</td>
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<td>79.9</td>
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<td>Ammophoska (12-24-12)</td>
<td>395</td>
<td>253</td>
<td>142</td>
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<tr>
<td>Nitrophoska (16-16-21)</td>
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<td>241</td>
<td>111</td>
<td>79.0</td>
</tr>
<tr>
<td>No nitrogen</td>
<td>276</td>
<td>276</td>
<td>0</td>
<td>81.3</td>
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<tr>
<td>No fertilizer</td>
<td>181</td>
<td>280</td>
<td>-99</td>
<td>83.8</td>
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</table>

Phosphorus Sources Test
The purpose of this test is to determine the relative efficiency of the various phosphates in cotton production. The

<table>
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<tr>
<th>Sources</th>
<th>Lb. seed cotton per acre</th>
<th>No phosphorus check</th>
<th>Increase</th>
<th>Lb. seed cotton per acre</th>
<th>No phosphorus check</th>
<th>Increase</th>
<th>Bolls per lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superphosphate</td>
<td>945</td>
<td>850</td>
<td>95</td>
<td>794</td>
<td>588</td>
<td>206</td>
<td>83.0</td>
</tr>
<tr>
<td>Ruhl's phosphate</td>
<td>893</td>
<td>834</td>
<td>59</td>
<td>626</td>
<td>561</td>
<td>65</td>
<td>76.7</td>
</tr>
<tr>
<td>Colloidal phosphate</td>
<td>848</td>
<td>842</td>
<td>6</td>
<td>578</td>
<td>553</td>
<td>25</td>
<td>79.2</td>
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<tr>
<td>No phosphate</td>
<td>826</td>
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<td>0</td>
<td>570</td>
<td>570</td>
<td>0</td>
<td>77.4</td>
</tr>
<tr>
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<td>819</td>
<td>-178</td>
<td>304</td>
<td>579</td>
<td>-275</td>
<td>87.0</td>
</tr>
</tbody>
</table>
data are presented in Table 6 as one and three-year averages. Six hundred pounds per acre of 6-0-6 fertilizer was applied to all plots except the no fertilizer plots. The phosphatic materials were applied, irrespective of analysis, at the rate of 300 pounds per acre to their respective plots.

**Potash Sources Test**

This test was designed to test the relative efficiency of the potash in the various potash carriers in cotton production. The data are presented for 1931 and as an average of the result for three years, 1929-31. Plots used were similar in size, arrangement, and kind of soil to those used for the nitrogen sources tests.

Six hundred pounds of 6-12-0 fertilizer per acre was applied to all plots with the exception of the no fertilizer plots.

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Potash Sources Test with Cotton</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Average 1929-31</td>
</tr>
<tr>
<td></td>
<td>Lb. seed cotton per acre</td>
</tr>
<tr>
<td>Sources</td>
<td></td>
</tr>
<tr>
<td>Muriate</td>
<td>955</td>
</tr>
<tr>
<td>Kainit</td>
<td>926</td>
</tr>
<tr>
<td>Sulphate</td>
<td>876</td>
</tr>
<tr>
<td>Manure salt</td>
<td>852</td>
</tr>
<tr>
<td>Trona</td>
<td>836</td>
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<tr>
<td>No potash</td>
<td>825</td>
</tr>
<tr>
<td>No fertilizer</td>
<td>387</td>
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<table>
<thead>
<tr>
<th>Table 8</th>
<th>Potash Rates Test with Cotton</th>
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<tbody>
<tr>
<td>1929-31</td>
<td>1931</td>
</tr>
<tr>
<td></td>
<td>Lb. seed cotton per acre</td>
</tr>
<tr>
<td>600 lb. per acre N-P-K</td>
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</tr>
<tr>
<td>8-12-6</td>
<td>744</td>
</tr>
<tr>
<td>No fertilizer</td>
<td>298</td>
</tr>
<tr>
<td>8-12-0</td>
<td>679</td>
</tr>
<tr>
<td>8-12-2</td>
<td>780</td>
</tr>
<tr>
<td>8-12-4</td>
<td>845</td>
</tr>
<tr>
<td>8-12-6</td>
<td>800</td>
</tr>
<tr>
<td>8-12-8</td>
<td>811</td>
</tr>
<tr>
<td>8-12-10</td>
<td>796</td>
</tr>
<tr>
<td>8-12-12</td>
<td>806</td>
</tr>
</tbody>
</table>
The potash materials were applied at the rate of thirty-six pounds of potash (K₂O) per acre. The results for 1931 and for a three-year average are given in Table 7.

**Potash Rates Test**

This test was conducted on the same kind of soil as used for the potash sources tests, unimproved brown loam. In addition to the results of 1931, Table 8 gives a three-year average for this test. All plots were one-twentieth acre in size, composed of four 40-inch rows, and repeated three times.

**Hill Fertilizer Test**

This test was designed to ascertain the most economical fertilizer combination as well as rate of application in cotton production. The plots were one-twentieth acre in size, composed of four 40-inch rows, and the test planted in four replications. The soil used was very poor brown loam which had grown cotton continuously for seventy-five years, or more.

All fertilizers were applied at the rate of 600 pounds per acre, except the 1200, 1800, and 2400-pound applications, and were made from 16% nitrate of soda costing $46.00 per ton, 16% superphosphate costing $16.00 per ton and 48% muriate of potash costing $44.00 per ton. These prices of fertilizers are used in making all calculations of gain or loss due to fertilizer treatment.

### Table 9

**Hill Fertilizer Test**

<table>
<thead>
<tr>
<th>N-P-K</th>
<th>Lb. seed cotton per acre</th>
<th>Increase</th>
<th>Net gain</th>
<th>Lb. seed cotton per acre</th>
<th>Check</th>
<th>Increase</th>
<th>Net gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-8-4</td>
<td>910</td>
<td>581</td>
<td>3.42</td>
<td>1010</td>
<td>222</td>
<td>788</td>
<td>5.36</td>
</tr>
<tr>
<td>6-8-4</td>
<td>887</td>
<td>581</td>
<td>5.03</td>
<td>1018</td>
<td>202</td>
<td>816</td>
<td>7.63</td>
</tr>
<tr>
<td>4-8-4</td>
<td>823</td>
<td>426</td>
<td>3.14</td>
<td>875</td>
<td>281</td>
<td>594</td>
<td>4.93</td>
</tr>
<tr>
<td>2-8-4</td>
<td>554</td>
<td>236</td>
<td>-50</td>
<td>554</td>
<td>318</td>
<td>236</td>
<td>-50</td>
</tr>
<tr>
<td>0-8-4</td>
<td>339</td>
<td>-1</td>
<td>-3.48</td>
<td>339</td>
<td>340</td>
<td>-1</td>
<td>-3.48</td>
</tr>
<tr>
<td>Phosphorus variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-10-4</td>
<td>696</td>
<td>330</td>
<td>.24</td>
<td>720</td>
<td>274</td>
<td>446</td>
<td>1.38</td>
</tr>
<tr>
<td>4-8-4</td>
<td>823</td>
<td>426</td>
<td>3.14</td>
<td>875</td>
<td>281</td>
<td>594</td>
<td>4.93</td>
</tr>
<tr>
<td>4-6-4</td>
<td>654</td>
<td>370</td>
<td>2.87</td>
<td>635</td>
<td>183</td>
<td>452</td>
<td>2.70</td>
</tr>
<tr>
<td>4-4-4</td>
<td>607</td>
<td>324</td>
<td>2.66</td>
<td>555</td>
<td>185</td>
<td>350</td>
<td>1.25</td>
</tr>
<tr>
<td>4-0-4</td>
<td>531</td>
<td>124</td>
<td>-1.02</td>
<td>371</td>
<td>296</td>
<td>75</td>
<td>-3.04</td>
</tr>
<tr>
<td>Potash variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-8-8</td>
<td>802</td>
<td>360</td>
<td>0.20</td>
<td>848</td>
<td>320</td>
<td>528</td>
<td>2.50</td>
</tr>
<tr>
<td>4-8-6</td>
<td>789</td>
<td>370</td>
<td>1.05</td>
<td>837</td>
<td>300</td>
<td>535</td>
<td>3.25</td>
</tr>
<tr>
<td>4-8-4</td>
<td>823</td>
<td>426</td>
<td>3.14</td>
<td>875</td>
<td>281</td>
<td>594</td>
<td>4.93</td>
</tr>
<tr>
<td>4-8-2</td>
<td>717</td>
<td>343</td>
<td>1.47</td>
<td>765</td>
<td>261</td>
<td>504</td>
<td>3.67</td>
</tr>
<tr>
<td>4-8-0</td>
<td>694</td>
<td>343</td>
<td>2.10</td>
<td>734</td>
<td>242</td>
<td>492</td>
<td>4.00</td>
</tr>
<tr>
<td>4-8-4 variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 lbs.</td>
<td>823</td>
<td>426</td>
<td>3.14</td>
<td>875</td>
<td>281</td>
<td>594</td>
<td>4.93</td>
</tr>
<tr>
<td>1200 lbs.</td>
<td>1057</td>
<td>753</td>
<td>3.65</td>
<td>1313</td>
<td>207</td>
<td>1106</td>
<td>8.22</td>
</tr>
<tr>
<td>1800 lbs.</td>
<td>1164</td>
<td>840</td>
<td>-2.00</td>
<td>1529</td>
<td>299</td>
<td>1230</td>
<td>5.14</td>
</tr>
<tr>
<td>2400 lbs.</td>
<td>1279</td>
<td>934</td>
<td>-7.24</td>
<td>1727</td>
<td>251</td>
<td>1476</td>
<td>1.71</td>
</tr>
<tr>
<td>No fertilizer</td>
<td>392</td>
<td></td>
<td></td>
<td>288</td>
<td>288</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9 gives the results for 1931 and the average results for 1930-31. The increase represents the difference in pounds of seed cotton per acre between the fertilized and the unfertilized plots. The fertilizers under trial are grouped according to the variations of nitrogen, phosphorus, potash, and rate of application.

**Valley Fertilizer Test**

The purpose of this test is to ascertain the most profitable fertilizer combination and rate of application. The soil is improved brown loam valley land. Each plot was one-twentieth acre in size, composed of four 40-inch rows, and the treatment repeated three times. All fertilizers were applied at the rate of 600 pounds per acre, except the 1200, 1800, and 2400-pound applications and were made from nitrate of soda, superphosphate and muriate of potash.

Table 10 presents the results for 1931 and the average results for seven years. The increase represents the difference, in pounds of seed cotton per acre, between the fertilized and the unfertilized plots. The fertilizers under trial are grouped according to their variations of nitrogen, phosphorus, potash, and rate of application. This is the first season in seven years that yields secured from every fertilizer application in this test failed to make a profit. We attribute this to hopper damage and unfavorable weather conditions.

### Table 10

<table>
<thead>
<tr>
<th>Valley Fertilizer Test</th>
<th>Average 1925-1931</th>
<th>1931</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lb. seed cotton per acre</td>
<td>InCREASE</td>
</tr>
<tr>
<td><strong>Nitrogen variation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-8-4</td>
<td>1334</td>
<td>429</td>
</tr>
<tr>
<td>6-8-4</td>
<td>1391</td>
<td>481</td>
</tr>
<tr>
<td>4-8-4</td>
<td>1372</td>
<td>493</td>
</tr>
<tr>
<td><strong>Phosphorus variation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-8-4</td>
<td>1372</td>
<td>493</td>
</tr>
<tr>
<td>4-6-4</td>
<td>1357</td>
<td>447</td>
</tr>
<tr>
<td>4-4-4</td>
<td>1267</td>
<td>355</td>
</tr>
<tr>
<td><strong>Potash variation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-8-8</td>
<td>1545</td>
<td>661</td>
</tr>
<tr>
<td>4-8-6</td>
<td>1431</td>
<td>550</td>
</tr>
<tr>
<td>4-8-4</td>
<td>1372</td>
<td>493</td>
</tr>
<tr>
<td>4-8-2</td>
<td>1205</td>
<td>319</td>
</tr>
<tr>
<td>4-8-0</td>
<td>1026</td>
<td>129</td>
</tr>
<tr>
<td><strong>4-8-4 variation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 lbs.</td>
<td>1372</td>
<td>493</td>
</tr>
<tr>
<td>1200 lbs.</td>
<td>1522</td>
<td>618</td>
</tr>
<tr>
<td>1800 lbs.</td>
<td>1548</td>
<td>651</td>
</tr>
<tr>
<td>2400 lbs.</td>
<td>1590</td>
<td>701</td>
</tr>
<tr>
<td>No fertilizer</td>
<td>893</td>
<td></td>
</tr>
</tbody>
</table>

**Corn Varieties**

The purpose of this test is to determine the varieties of corn that are most productive and best adapted to the soil and
climate of this section. The test is composed of twenty varieties, each planted in single rows and repeated eight times. Highly improved brown loam valley land was used and 400 pounds of 4-8-6 (N-P-K) fertilizer applied per acre. The date of planting was April 28. Table 11 gives the results for 1931 and the average results for 5 years. The varieties are arranged in order of their grain production for 1931.

Table 11
Corn Variety Test

<table>
<thead>
<tr>
<th>Varieties</th>
<th>1931 Bu. grain per acre</th>
<th>1931 Per cent grain</th>
<th>Average 1927-31 Bu. grain per acre</th>
<th>Average 1927-31 Per cent grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hastings</td>
<td>84.2</td>
<td>86.8</td>
<td>73.4</td>
<td>83.2</td>
</tr>
<tr>
<td>Dixie White Dent</td>
<td>71.2</td>
<td>85.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College G-4</td>
<td>67.7</td>
<td>80.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocke's Prolific, Station</td>
<td>67.5</td>
<td>84.6</td>
<td>65.7</td>
<td>82.3</td>
</tr>
<tr>
<td>Jallicorse</td>
<td>65.8</td>
<td>84.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mosby, Delta</td>
<td>63.7</td>
<td>84.8</td>
<td>61.8</td>
<td>81.7</td>
</tr>
<tr>
<td>Mosby Station</td>
<td>62.9</td>
<td>86.0</td>
<td>63.1</td>
<td>81.3</td>
</tr>
<tr>
<td>Paymaster</td>
<td>62.1</td>
<td>83.5</td>
<td>64.3</td>
<td>81.0</td>
</tr>
<tr>
<td>College 47</td>
<td>60.1</td>
<td>81.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Y 4</td>
<td>59.9</td>
<td>84.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocke's Prolific, Wood</td>
<td>48.8</td>
<td>82.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laguna</td>
<td>48.7</td>
<td>85.0</td>
<td>53.3</td>
<td>79.2</td>
</tr>
<tr>
<td>Mosby, Suttle</td>
<td>45.5</td>
<td>87.1</td>
<td>56.0</td>
<td>83.4</td>
</tr>
<tr>
<td>Golden Dent R. H.</td>
<td>44.8</td>
<td>84.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexican June</td>
<td>44.7</td>
<td>84.6</td>
<td>47.3</td>
<td>79.4</td>
</tr>
<tr>
<td>Jarvis</td>
<td>43.4</td>
<td>84.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Golden Dent</td>
<td>31.5</td>
<td>82.8</td>
<td>48.2</td>
<td>76.4</td>
</tr>
<tr>
<td>Yellow Dent Ferguson</td>
<td>27.6</td>
<td>84.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reese's Drouth Resister</td>
<td>25.5</td>
<td>81.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Silage and Grain Test

The purpose of this test is to determine the relative silage and grain productive values of corn, sagrain, sorghum, atlas sorgo and grohoma.

All plots were one-twentieth of an acre in size, composed of four 40-inch rows, and the treatments repeated four times. The soil used was unimproved brown loam table-land. Six hundred pounds of 4-8-6 (N-P-K) fertilizer was applied per acre, and the crops planted June 1. The two outside rows on each plot were harvested for silage yields and grain yields determined on the middle two rows.

Grohoma and atlas sorgo were severely damaged by the

Table 12
Silage and Grain Test

<table>
<thead>
<tr>
<th>Crops</th>
<th>Tons silage</th>
<th>Bushels grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese seeded ribbon cane</td>
<td>15.0</td>
<td>7.3</td>
</tr>
<tr>
<td>Corn</td>
<td>8.4</td>
<td>65.9</td>
</tr>
<tr>
<td>Atlas sorgo</td>
<td>8.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Grohoma</td>
<td>6.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Sagrain</td>
<td>5.3</td>
<td>24.0</td>
</tr>
</tbody>
</table>
sorghum midge, while the saigrain and Japanese seeded ribbon cane were damaged very little. Corn is our safest feed grain crop. Japanese seeded ribbon cane has so far been unsurpassed at this station for silage production; a greater tonnage and a more satisfactory silage has always been secured from it.

**Winter Cover Crops for Corn**

This test is designed to study the effects of plowing under winter cover crops upon the yield of succeeding crops of corn over a period of several years. The test is composed of ten plots one-twentieth acre each and repeated four times. Fertilizer was applied under corn at the rate of 400 pounds per acre where designated.

Vetch, Austrian pea, crimson clover, and rye made growth that was highly satisfactory, but red clover made poor growth probably due to insufficient lime. The cover crops were planted October 2, 1930, plowed under May 1, 1931, and the land planted to Golden Jarvis corn May 23, 1931. Table 13 presents the results for 1931 in yield of corn per acre and the height of cover crop when plowed under.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fertilizer</th>
<th>Bu. corn per acre</th>
<th>Bu. increase over 0-8-4</th>
<th>Height of cover crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>No cover</td>
<td>0-0-0</td>
<td>50.4</td>
<td>-16.2</td>
<td></td>
</tr>
<tr>
<td>No cover</td>
<td>0-8-4</td>
<td>66.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No cover</td>
<td>6-8-4</td>
<td>78.0</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Red clover</td>
<td>0-8-4</td>
<td>69.3</td>
<td>2.7</td>
<td>20 in.</td>
</tr>
<tr>
<td>Austrian winter pea</td>
<td>0-8-4</td>
<td>85.0</td>
<td>18.4</td>
<td>32 in.</td>
</tr>
<tr>
<td>Hairy vetch</td>
<td>0-8-4</td>
<td>85.2</td>
<td>18.6</td>
<td>42 in.</td>
</tr>
<tr>
<td>Crimson clover</td>
<td>0-8-4</td>
<td>86.7</td>
<td>20.1</td>
<td>24 in.</td>
</tr>
<tr>
<td>Abruzzi rye</td>
<td>0-8-4</td>
<td>52.3</td>
<td>-14.3</td>
<td>5.5 ft.</td>
</tr>
<tr>
<td>Abruzzi rye</td>
<td>6-8-4</td>
<td>61.2</td>
<td>-5.4</td>
<td>6.0 ft.</td>
</tr>
</tbody>
</table>

**Rotation Studies with Cotton, Corn, Sorghum, and Hairy Vetch**

Two adjoining tracts of land, about six acres each, were built up to similar fertility by sixteen years of crop rotation, including legumes, which increased the organic matter and nitrogen content of the soil. In 1925 a cotton fertilizer test was started on one of these tracts and has been repeated annually without cover crops. The adjoining tract of six acres was divided into two, three-acre plots and continued in a rotation as follows: first year, cotton followed by vetch and the vetch allowed to mature; second year, corn or silage followed by a volunteer crop of vetch, occasionally cut for hay; and third year, cotton. The volunteer vetch was plowed under about the first week in April in time for planting cotton April 21. Cotton was alternated from one plot to the other with corn and soybeans, or sorghum. Each year the rotation plot received an application of 600 pounds of 4-8-8 fertilizer, which is the
same treatment given the continuous cotton plot. Table 14 presents the results of this study in pounds of seed cotton per acre extending over a period of seven years.

Table 14
The Effect of Rotation and Commercial Fertilizer on the Yield of Cotton

<table>
<thead>
<tr>
<th>Yields in pounds of seed cotton per acre</th>
<th>1925</th>
<th>1926</th>
<th>1927</th>
<th>1928</th>
<th>1929</th>
<th>1930</th>
<th>1931</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton continuously without fertilizer</td>
<td>1561</td>
<td>1213</td>
<td>824</td>
<td>786</td>
<td>763</td>
<td>714</td>
<td>390</td>
<td>893</td>
</tr>
<tr>
<td>Cotton continuously and 600 lbs. 4-8-8</td>
<td>1996</td>
<td>2065</td>
<td>1238</td>
<td>1605</td>
<td>1814</td>
<td>1414</td>
<td>662</td>
<td>1545</td>
</tr>
<tr>
<td>Cotton in rotation and 600 lbs. 4-8-8</td>
<td>1550</td>
<td>1973</td>
<td>1637</td>
<td>2148</td>
<td>2401</td>
<td>1970</td>
<td>1061</td>
<td>1820</td>
</tr>
</tbody>
</table>

The trend of production on the two plots cropped continuously to cotton is downward, gradually downward on the plot receiving 600 pounds 4-8-8 fertilizer, and rapidly downward on the no fertilizer plot. Excepting the last two unfavorable years, the rotation tract shows an improvement in productivity. The average yield is 1820 pounds of seed cotton per acre.

Organic Matter and Nitrogen—The lack of organic matter and nitrogen are important causes of low crop yields on most soils of Mississippi. Their low content of organic matter is responsible for a great amount of erosion. In this section of the state soil erosion is removing many times more plant food from the soil than crops are. The organic matter in most soils must be increased in order to obtain the best results from the use of fertilizers and lime.

Crop residues, stable manures, and green manures are three important sources of organic matter for the soil. Of these, crop residues are the cheapest. Stable manure is a valuable source of organic matter but it furnishes less material than crop residues. Green manure crops which do not take the place of other crops in the rotation may be used to good advantage, but cover crops which replace regular crops are generally too expensive to use.

The nitrogen requirements for crop production can be supplied economically to soils in this section of the state from the use of summer and winter legumes. Since nitrogen is a limiting factor in most soils of the state, their productive power can be built up greatly by including leguminous crops in the cropping system. Soybeans, vetches, peas, and some clovers have proved their worth as soil builders.

Summary
In a test of 14 standard varieties of cotton, Stoneville 3, Missdel 2, Cleveland 54, Stoneville 2, and D. & P. L. 4-8 are the five leading varieties in a two-year average. In the Main Cotton Variety test on valley land, the five leading varieties are: Missdel 2, Delfos 531, Missdel 1, Stoneville 2, and Stone-
ville 3; and on the hill land, Delfos 531, Missdel 1, Stoneville 3, Cleveland 884-4, and Stoneville 2.

In the nitrogen sources test the nitrate form of nitrogen showed some superiority over the other forms of nitrogen, though not decidedly so except in the case of ammophoska and nitrophoska, which gave the lowest yield per acre.

When compared on the basis of 300 pounds of material per acre, superphosphate, Ruhm’s phosphate and colloidal phosphate gave increases of 95, 59, and 6 pounds of seed cotton per acre, respectively, in a two-year average, and 206, 65, and 25 pounds per acre for 1931.

In a test with the different sources of potash at the rate of 36 pounds of potash per acre, muriate of potash and kainit showed a slight advantage in a two-year average with cotton. The potash rates test indicates that 24 pounds of potash per acre is perhaps the highest rate justified for cotton on an unimproved brown loam soil.

The result from the Hill Fertilizer test with cotton on an unimproved brown loam soil show the greatest gain from 600 pounds of 6-8-4 fertilizer.

The results of a three-year average in a test of 19 varieties of corn, Hastings, Station Cocke’s Prolific, Paymaster, Station Mosby, and Delta Mosby are the five leading varieties in the order named.

In a test comparing Japanese seeded ribbon cane, corn, atlas sorgo, grohoma, and sagrain as sources of silage, Japanese seeded ribbon cane took first place with 15 tons per acre, and corn second place with 8.4 tons. As a producer of grain, however, corn yielded 66 bushels and sagrain 24 bushels per acre. Austrian winter pea, hairy vetch, and crimson clover grown as winter cover crops increased the yield of corn 18.4, 18.6, and 20.1 bushels, respectively, but rye alone reduced the yield 14.3 bushels.

A rotation including vetch showed a considerable improvement in yield of cotton over land continually grown to cotton alone.