# SOILS RESEARCH IN SOUTHEAST MISSOURI 1960

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE COLUMBIA, MISSOURI

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SOILS

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Soil fertility experiments in 1960 emphasized the importance of an adequate and balanced supply of plant nutrients in crop production. All of the experiments, except those of soybeans, indicated that yields may be profitably increased by the application of the proper fertilizer.

The 1960 growing season started out cold and wet which necessitated replanting. In some fields a third planting of cotton was made. Good planting seed became scarce and in some instances the best adapted cotton varieties were not available. In one soil fertility experiment the combination of Verticillium wilt and a susceptible variety limited the response to fertilizer treatment.

Soil fertility experiments were conducted at the Sikeston Experiment Field, Bragg City Experiment Field and with eight cooperators where the soils represented the major types of Southeast Missouri. Soil tests and mechanical analyses were made on the soil at each location.

Chemical soil tests are intended to reveal deficiencies in nutrient levels of soils which can be corrected by heavy plowdown applications of fertilizers. Soil tests are not designed to show the amount of starter fertilizers necessary. Starter fertilizers are usually justified, as the release of nutrients from the soil is slow during wet and cool seasons such as 1960.

Nitrogen appears to be the most needed fertilizer element for cotton. It is frequently difficult to determine the correct time of application and the proper amount to add. High rates of nitrogen without phosphate and potash may produce unfavorable results depending upon release of nutrients from the soil. The results indicate that approximately 50 pounds of nitrogen banded by the row was ample in the sandy soils. Whereas on the heavy soils, 50 to 100 pounds of nitrogen were efficient applications. The very few experiments having rates higher than 100 pounds of nitrogen per acre show that these rates are justified only on the heavier clay soils similar to that of the Bragg City Experiment Field.

The application of 50+50+50 banded by the cotton row has produced high yields on the sandy soil where moisture is not a limiting factor. Irrigation on the sandy soils has been a very profitable operation over the past 5 years where ample fertilizer has been applied. The practice of growing rye and vetch cover crops on these soils decreases the need for nitrogen and is very beneficial in supplying organic matter and preventing wind erosion.

The heavier soils, "mixed" (loam) and "gumbo" (clay) usually contain medium to high amounts of plant foods according to soil test. Due to their cold and wet nature, and slow release of plant nutrients, in the spring a starter fertilizer supplying 50+50+50 aids the early growth of the cotton plant. An additional 40 to 50 pounds of nitrogen has produced optimum yields when sidedressed at the time of blooming.

The source of nitrogen influences the yields of cotton. Ammonium nitrate and ammonium sulphate have been consistent in their performances on the various soil types. The other sources have not been as reliable although in some instances have produced equally well as the above two mentioned.

The crop response to equivalent amounts of fertilizer is greatly influenced by the method in which it is applied. The application of 48+48+48 in a narrow band near the seed or under the bed on the heavier soils has been most effective. Banding near the seed on the sandy soils at time of planting has produced best results. Broadcasting and plowing down has not given as good results as the banding applications.

Trace element mixture applied at the rate of 50 pounds per acre has increased the yield of cotton at several locations. Further research is necessary to determine the individual soils where the application of trace elements may be necessary or will be a profitable practice for economical cotton production.

Cotton has a low calcium requirement, but limestone is often necessary for the most efficient use of other fertilizer nutrients. Lime needs are best determined by soil tests.

Irrigation has increased the effectiveness of fertilizers in extremely dry years and has improved yields of cotton on clay and clay loam soils. Supplemental water has been used profitably immediately after planting to obtain a stand where soil has become too dry for the germination of seed. Additional research will be necessary to evaluate the place of irrigation as it is related to efficient use of plant nutrients and maturity of the cotton crop.

The requirements of corn, soybeans and small grains for fertilizer nutrients have been studied for several years on different soil types. On sandy soils nitrogen gives best results when applied at planting time or sidedressed later. Results have shown that nitrogen plowed down in the fall does not give as much response as when applied in the spring.

Yields of soybeans have not been greatly increased by use of fertilizer applications. A 25+25+25 starter fertilizer has given moderate returns. Further research on soybean nutrition is needed before large returns can be expected from chemical fertilizers. (Projects 267, 268, 357).

## SUMMARY OF SOIL TESTS

Chemical soil tests determine the fertility level of a soil and indicate the quantities of plant nutrients that should be applied as fertilizers to produce optimum crop yields. According to the Missouri system these nutrients are to be applied as a basic or a plow down application. The chemical tests are not designed to determine the amount or kind of starter fertilizer to apply.

Soil organic matter or humus supplies most of the nitrogen and much of the phosphorus used by crops on unfertilized fields. It is an important source of supply of these nutrients on fertilized fields as well. The nutrients in humus are released most rapidly during warm moist weather and slowly when soils are cold and wet. For this reason starter fertilizers are most beneficial during cool,wet springs. Sandy soils contain small amounts of organic matter, hence have a small reserve supply of nitrogen and phosphorus and require larger amounts of fertilizer applications than do silt or clay soils for good crop yields. Maintaining an adequate amount of organic matter in the soil is one objective of good soil management. Cover crops and plowing down of crop residues are good management practices for maintaining organic matter in soils.

Chemical soil tests have shown that a majority of the soils of Southeast Missouri contain large quantities of phosphorus and potassium. However, experiments have shown that in the majority of cases additional amounts of these elements applied in soluble form and concentrated in an area close to the seed will hasten maturity and increase yields of cotton.

The calcium and magnesium contents of a large percentage of soils in Southeast Missouri have been adequate for cotton production. Only where soil tests have shown a low value has there been a response from liming. It is known that a low calcium level may decrease the availability of other plant nutrients. Cotton grown on soils with a pH of 4.5 and 4.2 has responded to the application of limestone. The high level of magnesium in some of these soils has indicated a need for calcium limestone rather than dolomite (contains magnesium as well as calcium).

The relative quantities of sand, silt, and clay in a soil influence the ease with which it is tilled as well as its water and nutrient holding properties. Soil containing 30 per cent or more of clay is hard to till even though it contains a large amount of sand. Soils high in sand are droughty and the best yields of cotton have been obtained where they do not contain more than 80 to 85% of sand and silt combined. The composition of the soil on the Sikeston Experiment Field is excellent from the standpoint of crop production.

## SUMMARY OF COTTON RESPONSE TO SOIL TREATMENTS

Clay and Clay Loam Soils

(All yields expressed as pounds of lint cotton per acre).

| | Bragg City | | French&Maddox | | Pfeffer | | Orton | | Lee | | Roth | | Roth-Subsoil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Irrigated | | No Water | | No Water | | No Water | | No Water | | Irrigated | | Irrigated | |
| | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint | 1st. Pick | Tot. Lint |
| Comparison of Starter Fertilizer | | | | | | | | | | | | | | |
| No Fertilizer | 175 | 279 | 447 | 801 | 505 | 602 | 426 | 426 | 212 | 630 | 376 | 431 | 420 | 485 |
| 25+25+25 | 260 | 300 | 738 | 1072 | 751 | 780 | 601 | 601 | 262 | 750 | 524 | 593 | 502 | 548 |
| 50+50+50 | 464 | 509 | 409 | 775 | 814 | 878 | 684 | 684 | 194 | 855 | 610 | 704 | 585 | 661 |
| 100+100+100 (15-15-15) | 285 | 383 | 379 | 899 | 670 | 745 | 584 | 584 | 155 | 828 | 733 | 900 | 739 | 826 |
| 100+50+50 | 319 | 435 | 584 | 1034 | 669 | 746 | 672 | 672 | 208 | 919 | 648 | 790 | 684 | 804 |
| Rate of Nitrogen Application | | | | | | | | | | | | | | |
| No Fertilizer | 175 | 279 | 447 | 801 | 505 | 602 | 426 | 426 | 212 | 630 | 376 | 431 | 420 | 485 |
| 0+100+100 | 90 | 158 | 420 | 809 | 509 | 653 | 435 | 435 | 158 | 593 | 492 | 608 | 308 | 347 |
| 25+100+100 | 286 | 374 | 555 | 805 | 580 | 696 | 553 | 553 | 159 | 636 | 685 | 782 | 583 | 615 |
| 50+100+100 | 569 | 655 | 512 | 811 | 671 | 740 | 582 | 582 | 168 | 818 | 620 | 752 | 792 | 861 |
| 100+100+100 | 379 | 561 | 740 | 1113 | 684 | 774 | 639 | 639 | 135 | 825 | 571 | 689 | 882 | 972 |
| 50+0+0 | 272 | 342 | 469 | 950 | 503 | 608 | 507 | 507 | 153 | 643 | 581 | 693 | 495 | 552 |
| 100+0+0 | 376 | 505 | 517 | 864 | 732 | 768 | 467 | 467 | 178 | 730 | 568 | 705 | 604 | 705 |

The application of starter fertilizers increased yields of cotton in 1960 on the clay soils in Southeast Missouri. In all but one of the above experiments 50+50+50 produced a profitable yield and at two locations where the cotton was irrigated higher rates of fertilizer were justified.

Starter fertilizer applied close to the seed early in the season provided an ample supply of plant nutrients when the release of plant nutrients was slow from these heavy soils. Experimental results indicate that starter fertilizer should be banded under the bed before rebedding or placed close to but not in contact with the seed at planting time.

The higher rates of nitrogen in most cases were justified in 1960 providing ample phosphate and potash was included in the fertilizer application. Previous results indicate over a period of 3 years at Bell City and 4 years at Bragg City, that the 100 pound rate of nitrogen produced the highest yield, with a slight delay in maturity at Bell City.

| Clay and Clay Loam Soils | Bragg City Irrigated | | French-Maddox No Water | | Pfeffer No Water | | Orton No Water | | Lee No Water | | Roth Irrigated | | Roth-Subsoil Irrigated | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint | 1st Pick | Tot. Lint |
| **Rate of Phosphate Application** | | | | | | | | | | | | | | |
| No Fertilizer | 175 | 279 | 447 | 801 | 505 | 602 | 426 | 426 | 212 | 630 | 376 | 431 | 420 | 485 |
| 100+0+100 | 467 | 649 | 425 | 929 | 746 | 856 | 599 | 599 | 213 | 900 | 677 | 828 | 770 | 905 |
| 100+25+100 | 473 | 571 | 628 | 1089 | 788 | 897 | 613 | 613 | 189 | 871 | 863 | 1021 | 880 | 991 |
| 100+50+100 | 483 | 601 | 575 | 1101 | 652 | 806 | 598 | 598 | 201 | 920 | 875 | 1026 | 927 | 1003 |
| 100+100+100 | 379 | 561 | 740 | 1113 | 684 | 774 | 639 | 639 | 135 | 825 | 571 | 689 | 882 | 972 |

Phosphorus applied as a starter fertilizer at rates of 25 to 50 lbs. of $P_2O_5$ per acre increased yields of lint cotton in 1960. These increases were noted at both pickings. Higher rates of phosphorus in general were not profitable and in some instances depressed yields.

The soils of Southeast Missouri usually contain ample phosphate according to chemical soil tests but experiments over the last 5 years indicate that a starter fertilizer which includes phosphorus is necessary for optimum yields.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rate of Potash Application** | | | | | | | | | | | | | | |
| No Fertilizer | 175 | 279 | 447 | 801 | 505 | 602 | 426 | 426 | 212 | 630 | 376 | 431 | 420 | 485 |
| 100+100+0 | 398 | 488 | 601 | 862 | 769 | 829 | 602 | 602 | 138 | 707 | 493 | 580 | 399 | 449 |
| 100+100+25 | 572 | 688 | 510 | 756 | 580 | 670 | 516 | 516 | 182 | 866 | 460 | 528 | 464 | 546 |
| 100+100+50 | 592 | 687 | 558 | 906 | 929 | 984 | 547 | 547 | 168 | 843 | 610 | 696 | 751 | 834 |
| 100+100+100 | 379 | 561 | 740 | 1113 | 684 | 774 | 639 | 639 | 135 | 825 | 571 | 689 | 882 | 972 |

From 50 to 100 lbs. per acre of potash in the starter fertilizer gave profitable increases in yield in 1960 on the clay and clay loam soils of Southeast Missouri. According to soil tests, the need for basic treatments of potash were not indicated. Results obtained in past seasons agree with those obtained in 1960. An application of 50 to 100 lbs. of potash in the starter fertilizer should be used on the heavy clay soils for the most profitable yields of cotton.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Trace Mineral Application** | | | | | | | | | | | | | | |
| No Fertilizer | 175 | 279 | 447 | 801 | 505 | 602 | 426 | 426 | 212 | 630 | 376 | 431 | 420 | 485 |
| 100+100+100 | 379 | 561 | 740 | 1113 | 684 | 774 | 639 | 639 | 135 | 825 | 571 | 689 | 882 | 972 |
| 100+100+100+50#Traces | 412 | 568 | 710 | 1133 | 797 | 877 | 690 | 690 | 204 | 834 | 566 | 682 | 870 | 991 |
| 100+100+100 (15-15-15) | 285 | 383 | 379 | 899 | 670 | 745 | 584 | 584 | 155 | 828 | 733 | 900 | 739 | 826 |
| 100+100+100+Traces *(12-12-12-TM) | 391 | 483 | 557 | 984 | 629 | 711 | 637 | 637 | 180 | 894 | 770 | 913 | 722 | 815 |

*Trace elements added to 12-12-12 in process of granulation.

The application of trace elements separate from the standard starter fertilizer increased yields slightly on all but one soil in 1960. Combining the trace elements with the fertilizer at time of granulation and applying this as starter fertilizer did not give the same results as applying the trace elements in a separate operation. Past years' experiments have shown that applying trace elements to claypan soils has been beneficial though the extent of yield increase has frequently been small.

Sandy and Sandy Loam Soils

| | Burge Irrigated | | Gardner Irrigated | | Sikeston Experiment Field No Water | |
|---|---|---|---|---|---|---|
| Comparison of Starter Fertilizer | First Pick | Total Lint | First Pick | Total Lint | First Pick | Total Lint |
| No fertilizer | 643 | 705 | 514 | 820 | 583 | 797 |
| 25+25+25 | 683 | 777 | 491 | 917 | 532 | 754 |
| 50+50+50 | 622 | 741 | 436 | 849 | 587 | 774 |
| 100+100+100 (15-15-15) | 573 | 733 | 343 | 733 | 507 | 806 |
| 100+50+50 | 716 | 836 | 394 | 824 | 513 | 783 |

Starter fertilizers gave profitable increases in yield on two of these sandy soils. The available nutrient level on the Sikeston Experiment Field soil was sufficiently high that no significant increases was obtained.

| Rate of Nitrogen Application | | | | | | |
|---|---|---|---|---|---|---|
| No fertilizer | 643 | 705 | 514 | 820 | 583 | 797 |
| 0+100+100 | 581 | 632 | 463 | 767 | 643 | 826 |
| 25+100+100 | 661 | 730 | 384 | 742 | 798 | 942 |
| 50+100+100 | 714 | 809 | 428 | 856 | 921 | 1050 |
| 100+100+100 | 675 | 785 | 359 | 682 | 948 | 1104 |
| 50+0+0 | 800 | 935 | 469 | 828 | 603 | 871 |
| 100+0+0 | 888 | 1076 | 517 | 993 | 338 | 632 |

The application of 50 pounds of nitrogen usually produces favorable yields of lint on sandy soils. The response from the 100 pound rate is usually unpredictable. However, in 1960 there were profitable returns from a 100 pound per acre application when properly balanced with phosphorus and potash from a complete fertilizer, or when the soil level was high resulting from previous good management practices.

| Rate of Phosphate Application | | | | | | |
|---|---|---|---|---|---|---|
| No fertilizer | 643 | 705 | 514 | 820 | 583 | 797 |
| 100+0+100 | 715 | 870 | 365 | 826 | 736 | 921 |
| 100+25+100 | 658 | 811 | 384 | 820 | 796 | 959 |
| 100+50+100 | 642 | 799 | 413 | 892 | 839 | 1026 |
| 100+100+100 | 675 | 785 | 359 | 682 | 948 | 1104 |

The applications of phosphorus up to 100 pounds $P_2O_5$ per acre increased yields at the Sikeston E periment Field. The addition of 50 pounds $P_2O_5$ were sufficient on the Gardner cooperative plot. Highest yields on the Burge plot were obtained with no phosphorus in the starter fertilizer. Increasing phosphorus from 50 to 100 pounds of $P_2O_5$ depressed yields on the Burge and Gardner fields. In general, starter fertilizer for use on sandy soils should contain 25 to 50 pounds $P_2O_5$ per acre for best results with cotton.

| Sandy and Sandy Loam Soils | Burge Irrigated | | Gardner Irrigated | | Sikeston Experiment Field No Water | |
|---|---|---|---|---|---|---|
| | First Pick | Total Lint | First Pick | Total Lint | First Pick | Total Lint |
| **Rate of Potash Application** | | | | | | |
| No fertilizer | 643 | 705 | 514 | 820 | 583 | 797 |
| 100+100+0 | 746 | 873 | 376 | 829 | 767 | 939 |
| 100+100+25 | 756 | 941 | 412 | 824 | 746 | 934 |
| 100+100+50 | 698 | 871 | 454 | 904 | 869 | 1015 |
| 100+100+100 | 675 | 785 | 359 | 682 | 948 | 1104 |

Yields of lint cotton on sandy soils were increased by use of potash in 1960. Yields were depressed by the 100 pound applications of $K_2O$ on the Burge and Gardner soils. These results confirm those of previous years that about 50 pounds of potash should be applied in a starter fertilizer when cotton is grown on light sandy soils.

| Trace Mineral Application | | | | | | |
|---|---|---|---|---|---|---|
| No fertilizer | 643 | 705 | 514 | 820 | 583 | 797 |
| 100+100+100 | 675 | 785 | 359 | 682 | 948 | 1104 |
| 100+100+100+50 lbs. Traces | 795 | 906 | 414 | 853 | 724 | 986 |
| 100+100+100 (15-15-15) | 573 | 733 | 343 | 733 | 507 | 806 |
| 100+100+100+TM(12-12-12-TM)* | 717 | 859 | 337 | 617 | 678 | 951 |

*Trace elements added to 12-12-12 in process of granulation.

Cotton yields were increased in 1960 from the trace minerals, applied separately from the other fertilizer nutrients. Mixing the trace elements with the other fertilizer elements at the time of granulation did not give this response.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey Clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.1 | 232 | 500 | 800 | 6200 | 6.1 | 2.0 | 21.5 | 5.9 |
| Subsoil: | 1.5 | 140 | 260 | 760 | 5700 | 5.4 | 3.5 | 21.2 | 6.3 |

Rex cotton replanted May 28.

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 175 | 104 | 63 | 37.4 | 86 | 1 3/32 | 18 | 279 | - |
| 0-100-100 | 90 | 68 | 57 | 36.7 | 84 | 1 1/16 | 16 | 158 | -121 |
| 25-100-100 | 286 | 88 | 77 | 37.5 | 86 | 1 1/16 | 19 | 374 | 95 |
| 50-100-100 | 569 | 86 | 87 | 37.9 | 78 | 1 1/8 | 21 | 655 | 376 |
| @100-100-100 | 379 | 182 | 68 | 36.3 | 67 | 1 3/32 | 22 | 561 | 282 |
| @100-100-100-TM | 412 | 156 | 73 | 36.7 | 67 | 1 3/32 | 21 | 568 | 289 |
| @100-50-100 | 483 | 118 | 80 | 36.9 | 74 | 1 3/32 | 24 | 601 | 322 |
| @100-25-100 | 473 | 98 | 83 | 36.3 | 73 | 1 1/8 | 22 | 571 | 292 |
| @100-0-100 | 467 | 182 | 72 | 37.1 | 72 | 1 3/32 | 24 | 649 | 370 |
| @100-100-50 | 592 | 95 | 86 | 378 | 73 | 1 1/8 | 20 | 687 | 408 |
| @100-100-25 | 572 | 116 | 83 | 37.8 | 77 | 1 3/32 | 22 | 688 | 409 |
| @100-100-0 | 398 | 90 | 82 | 37.5 | 73 | 1 1/16 | 22 | 488 | 209 |
| 50-50-50 | 464 | 45 | 91 | 37.2 | 76 | 1 3/32 | 22 | 509 | 230 |
| 25-25-25 | 260 | 40 | 87 | 38.3 | 78 | 1 3/32 | 19 | 300 | 21 |
| 100-50-50 | 319 | 116 | 73 | 37.2 | 70 | 1 1/8 | 25 | 435 | 156 |
| *100-100-100-TM | 391 | 92 | 81 | 38.3 | 74 | 1 1/16 | 21 | 483 | 204 |
| **100-100-100 | 285 | 98 | 75 | 37.7 | 69 | 1 1/8 | 23 | 383 | 104 |
| 50-0-0 | 272 | 70 | 80 | 37.2 | 73 | 1 1/8 | 24 | 342 | 63 |
| @100-0-0 | 376 | 129 | 75 | 37.5 | 72 | 1 3/16 | 23 | 505 | 226 |

@ 50 pounds nitrogen applied at planting and 50 pounds sidedressed in July.

* Trace minerals added to fertilizer in process of granulation.

** 15-15-15 at planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: O. E. Poeffer
Location: Four miles west of Parma, Missouri
Soil Type: Sharkey Clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.0 | 208 | 420 | 670 | 6700 | 5.6 | 4.0 | 24.1 | 5.6 |
| Subsoil: | 2.2 | 50 | 440 | 640 | 6100 | 6.0 | 3.0 | 21.5 | 6.0 |

Fox cotton replanted May

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 505 | 98 | 84 | 38.3 | 70 | 1 1/8 | 25 | 602 | |
| 0-100-100 | 509 | 144 | 78 | 37.8 | 70 | 1 1/8 | 28 | 653 | 51 |
| 25-100-100 | 580 | 116 | 83 | 38.3 | 75 | 1 1/8 | 26 | 696 | 94 |
| 50-100-100 | 671 | 69 | 91 | 38.5 | 70 | 1 1/8 | 25 | 740 | 138 |
| @100-100-100 | 684 | 91 | 88 | 38.7 | 71 | 1 1/8 | 27 | 774 | 172 |
| @100-100-100-TM | 797 | 81 | 91 | 39.0 | 67 | 1 1/8 | 29 | 877 | 275 |
| @100-50-100 | 652 | 155 | 81 | 38.6 | 66 | 1 3/32 | 29 | 806 | 204 |
| @100-25-100 | 788 | 109 | 88 | 38.4 | 65 | 1 1/8 | 30 | 897 | 295 |
| @100-0-100 | 746 | 110 | 87 | 38.6 | 65 | 1 1/8 | 32 | 856 | 254 |
| @100-100-50 | 929 | 55 | 94 | 37.7 | 66 | 1 1/8 | 29 | 984 | 382 |
| @100-100-25 | 580 | 90 | 87 | 38.1 | 62 | 1 1/8 | 31 | 670 | 68 |
| @100-100-0 | 769 | 60 | 93 | 38.2 | 69 | 1 3/32 | 32 | 829 | 227 |
| 50-50-50 | 814 | 64 | 93 | 38.5 | 68 | 1 1/8 | 31 | 878 | 276 |
| 25-25-25 | 751 | 29 | 96 | 38.9 | 76 | 1 1/8 | 28 | 780 | 178 |
| 100-50-50 | 669 | 77 | 90 | 38.3 | 72 | 1 1/8 | 32 | 746 | 144 |
| *100-100-100-TM | 629 | 82 | 89 | 38.8 | 69 | 1 3/32 | 33 | 711 | 109 |
| **100-100-100 | 670 | 75 | 90 | 38.7 | 74 | 1 1/8 | 30 | 745 | 143 |
| 50-0-0 | 503 | 105 | 83 | 39.0 | 72 | 1 1/8 | 31 | 608 | 6 |
| @100-0-0 | 732 | 36 | 95 | 38.4 | 77 | 1 1/8 | 27 | 768 | 166 |
| 50+100+100 +500# Fine Lime +50# Traces | 645 | 108 | 86 | 38.3 | 72 | 1 1/8 | 29 | 753 | 151 |

@ 50 pounds nitrogen applied at planting and 50 pounds nitrogen sidedressed in July
* Trace minerals added to fertilizer in process of granulation.
** 15-15-15 at planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Donald French and W. D. Maddox
Location: Five miles south of Malden on Highway 25 and one mile east of Mt. Gilean Cemetery.
Soil Type: Sharkey Clay Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.9 | 302 | 195 | 520 | 4600 | 5.7 | 3.0 | 16.9 | 5.2 |
| Subsoil: | 0.7 | 232 | 130 | 700 | 4300 | 6.0 | 2.5 | 16.3 | 5.5 |

Delfos cotton replanted May 14.

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 447 | 354 | 56 | 36.1 | 67 | 1 3/16 | 33 | 801 | |
| 0-100-100 | 420 | 389 | 52 | 36.5 | 63 | 1 3/16 | 37 | 809 | 8 |
| 25-100-100 | 555 | 250 | 69 | 36.3 | 67 | 1 7/32 | 39 | 805 | 4 |
| 50-100-100 | 512 | 299 | 63 | 36.3 | 66 | 1 3/16 | 37 | 811 | 10 |
| @100-100-100 | 740 | 373 | 67 | 35.6 | 67 | 1 3/16 | 39 | 1113 | 312 |
| @100-100-100-TM | 710 | 423 | 63 | 36.2 | 62 | 1 3/16 | 37 | 1133 | 332 |
| @100-50-100 | 575 | 526 | 52 | 35.6 | 63 | 1 3/16 | 37 | 1101 | 300 |
| @100-25-100 | 628 | 461 | 58 | 35.8 | 61 | 1 7/32 | 37 | 1089 | 288 |
| @100-0-100 | 425 | 504 | 46 | 35.3 | 62 | 1 3/16 | 34 | 929 | 128 |
| @100-100-50 | 558 | 348 | 62 | 36.1 | 58 | 1 3/16 | 36 | 906 | 105 |
| @100-100-25 | 510 | 246 | 68 | 35.8 | 63 | 1 3/16 | 36 | 756 | -45 |
| @100-100-0 | 601 | 261 | 70 | 35.3 | 62 | 1 5/32 | 34 | 862 | 61 |
| 50-50-50 | 409 | 336 | 53 | 35.5 | 61 | 1 3/16 | 39 | 775 | -26 |
| 25-25-25 | 738 | 334 | 69 | 36.7 | 72 | 1 3/16 | 37 | 1072 | 271 |
| 100-50-50 | 584 | 450 | 57 | 35.4 | 63 | 1 3/16 | 40 | 1034 | 233 |
| *100-100-100-TM | 557 | 427 | 57 | 36.0 | 58 | 1 7/32 | 41 | 984 | 183 |
| **100-100-100 | 379 | 520 | 42 | 35.6 | 62 | 1 3/16 | 41 | 899 | 98 |
| 50-0-0 | 469 | 481 | 49 | 35.4 | 60 | 1 3/16 | 41 | 950 | 149 |
| @100-0-0 | 517 | 347 | 60 | 35.4 | 67 | 1 3/16 | 38 | 864 | 63 |

@ 50 lbs. nitrogen applied at planting and 50 lbs. sidedressed in July

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Byars Orton
Location: Ten miles southeast of Portageville, Missouri
Soil Type: Sharkey Clay Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 3.2 | 276 | 470 | 860 | 7000+ | 7.2 | 0.5 | 22.2 | 6.9 |
| Subsoil: | 2.2 | 302 | 395 | 960 | 7000+ | 7.2 | 0.5 | 22.5 | 7.0 |

Fox #4 Cotton planted May 5

| Soil Treatment | Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|
| No Treatment | 426 | 36.5 | 77 | 1 1/16 | 24 | 426 | - |
| 0-100-100 | 435 | 36.5 | 73 | 1 1/16 | 29 | 435 | 9 |
| 25-100-100 | 553 | 37.2 | 75 | 1 3/32 | 28 | 553 | 127 |
| 50-100-100 | 582 | 37.5 | 73 | 1 3/32 | 29 | 582 | 156 |
| 100-100-100 | 639 | 37.3 | 69 | 1 3/32 | 32 | 639 | 213 |
| 100-100-100-TM | 690 | 37.5 | 77 | 1 3/32 | 28 | 690 | 264 |
| 100-50-100 | 598 | 37.0 | 76 | 1 3/32 | 30 | 598 | 172 |
| 100-25-100 | 613 | 37.2 | 77 | 1 1/16 | 30 | 613 | 187 |
| 100-0-100 | 599 | 36.5 | 79 | 1 1/16 | 30 | 599 | 173 |
| 100-100-50 | 547 | 36.5 | 72 | 1 1/16 | 31 | 547 | 121 |
| 100-100-25 | 516 | 36.7 | 76 | 1 3/32 | 30 | 516 | 90 |
| 100-100-0 | 602 | 36.8 | 77 | 1 1/16 | 31 | 602 | 176 |
| 50-50-50 | 684 | 37.5 | 77 | 1 1/16 | 31 | 684 | 258 |
| 25-25-25 | 601 | 36.7 | 74 | 1 1/16 | 29 | 601 | 175 |
| 100-50-50 | 672 | 37.7 | 73 | 1 1/16 | 30 | 672 | 246 |
| *100-100-100-TM | 637 | 37.0 | 76 | 1 3/32 | 32 | 637 | 211 |
| **100-100-100 | 584 | 36.3 | 72 | 1 1/16 | 31 | 584 | 158 |
| 50-0-0 | 507 | 37.9 | 74 | 1 1/16 | 31 | 507 | 81 |
| 100-0-0 | 467 | 36.7 | 77 | 1 3/32 | 31 | 467 | 41 |
| 50+50+50 (Liquid 8-8-8) | 583 | 35.7 | 76 | 1 3/32 | 35 | 583 | 157 |
| 50+50+50 (Liquid 8-8-8) 50 lb.N Sidedressed (Liquid 32-0-0) | 577 | 37.2 | 73 | 1 3/32 | 32 | 577 | 151 |

* Trace minerals added to fertilizer in process of granulation.

**Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

## IRRIGATED

Cooperator: James Roth
Location: Two miles northeast of Malden, Missouri
Soil Type: Sharkey Clay Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.5 | 262 | 220 | 900 | 3600 | 6.8 | 1.0 | 14.1 | 6.4 |
| Subsoil: | 1.2 | 205 | 185 | 860 | 4300 | 6.6 | 1.5 | 16.0 | 6.2 |

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | of Plant Inches | Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 376 | 55 | 87 | 36.6 | 80 | 1 3/32 | 21 | 431 | - |
| 0-100-100 | 492 | 116 | 81 | 39.9 | 79 | 1 3/32 | 26 | 608 | 177 |
| 25-100-100 | 685 | 97 | 88 | 40.2 | 70 | 1 1/16 | 25 | 782 | 351 |
| 50-100-100 | 620 | 132 | 82 | 37.2 | 66 | 1 3/32 | 28 | 752 | 321 |
| @100-100-100 | 571 | 118 | 83 | 37.7 | 66 | 1 1/16 | 28 | 689 | 258 |
| @100-100-100-TM | 566 | 116 | 83 | 36.8 | 64 | 1 3/32 | 29 | 682 | 251 |
| @100-50-100 | 875 | 151 | 85 | 38.1 | 66 | 1 3/32 | 26 | 1026 | 595 |
| @100-25-100 | 863 | 158 | 85 | 37.6 | 63 | 1 3/32 | 28 | 1021 | 590 |
| @100-0-100 | 677 | 151 | 82 | 37.4 | 69 | 1 3/32 | 29 | 828 | 397 |
| @100-100-50 | 610 | 86 | 88 | 38.2 | 64 | 1 1/16 | 27 | 696 | 265 |
| @100-100-25 | 460 | 68 | 87 | 37.4 | 69 | 1 3/32 | 27 | 528 | 97 |
| @100-100-o | 493 | 87 | 85 | 37.1 | 67 | 1 1/16 | 27 | 580 | 149 |
| 50-50-50 | 610 | 94 | 87 | 37.9 | 64 | 1 3/32 | 27 | 704 | 273 |
| 25-25-25 | 524 | 69 | 88 | 39.0 | 76 | 1 3/32 | 24 | 593 | 162 |
| 100-50-50 | 648 | 142 | 82 | 37.0 | 63 | 1 3/32 | 27 | 790 | 359 |
| *100-100-100-TM | 770 | 143 | 84 | 38.1 | 64 | 1 1/16 | 29 | 913 | 482 |
| **100-100-100 | 733 | 167 | 81 | 39.0 | 61 | 1 1/16 | 28 | 900 | 469 |
| 50-0-0 | 581 | 112 | 84 | 37.8 | 69 | 1 1/16 | 27 | 693 | 262 |
| @100-0-0 | 568 | 137 | 81 | 37.4 | 65 | 1 1/16 | 25 | 705 | 274 |
| 100#N (Sidedress 28% Liq) | 658 | 105 | 86 | 37.2 | 65 | 1 3/32 | 26 | 763 | 332 |
| 18+72+72 (Starter) | 512 | 160 | 76 | 37.9 | 64 | 1 3/32 | 28 | 672 | 241 |
| 18+72+72 (Starter) 50#N (Sidedress-Amo nit) | 545 | 134 | 80 | 36.2 | 67 | 1 1/8 | 29 | 679 | 248 |
| 18+72+72 (Starter) 50#N (Sidedress-28% Liq) | 619 | 139 | 82 | 36.0 | 65 | 1 3/32 | 30 | 758 | 327 |
| 18+72+72 500# Fine Lime 50#N (Sidedress-Amo Nit) | 600 | 119 | 83 | 36.6 | 72 | 1 3/32 | 25 | 719 | 288 |

@ 50 lbs. nitrogen applied at planting and 50 lbs. sidedressed in July

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION ON SUBSOIL

## IRRIGATED

Cooperator: James Roth
Location: Two miles northeast of Malden, Missouri
Soil Type: Sharkey Clay Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.1 | 264 | 320 | 960 | 4000 | 6.6 | 1.5 | 15.9 | 6.3 |
| | 0.7 | 74 | 175 | 960 | 4050 | 6.4 | 1.5 | 16.1 | 6.2 |

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 420 | 65 | 87 | 36.6 | 80 | 1 3/32 | 23 | 485 | - |
| 0 100-100 | 308 | 39 | 89 | 39.9 | 79 | 1 3/32 | 20 | 347 | -138 |
| 25-100-100 | 583 | 32 | 95 | 40.2 | 70 | 1 1/16 | 22 | 615 | 130 |
| 50-100-100 | 792 | 69 | 92 | 37.2 | 66 | 1 3/32 | 25 | 861 | 376 |
| @100-100-100 | 882 | 90 | 91 | 37.7 | 66 | 1 1/16 | 29 | 972 | 487 |
| @100-100-100-TM | 870 | 121 | 88 | 36.8 | 64 | 1 3/32 | 29 | 991 | 506 |
| @100-50-100 | 927 | 76 | 92 | 38.1 | 66 | 1 3/32 | 29 | 1003 | 518 |
| @100-25-100 | 880 | 111 | 89 | 37.6 | 63 | 1 3/32 | 30 | 991 | 506 |
| @100-0-100 | 770 | 135 | 85 | 37.4 | 69 | 1 3/32 | 30 | 905 | 420 |
| @100-100-50 | 751 | 83 | 90 | 38.2 | 64 | 1 1/16 | 28 | 834 | 349 |
| @100-100-25 | 464 | 82 | 85 | 37.4 | 69 | 1 3/32 | 29 | 546 | 61 |
| @100-100-0 | 399 | 50 | 89 | 37.1 | 67 | 1 1/16 | 26 | 449 | -36 |
| 50-50-50 | 585 | 76 | 89 | 37.9 | 64 | 1 3/32 | 27 | 661 | 176 |
| 25-25-25 | 502 | 46 | 92 | 39.0 | 76 | 1 3/32 | 22 | 548 | 63 |
| 100-50-50 | 684 | 120 | 85 | 37.0 | 63 | 1 3/32 | 26 | 804 | 319 |
| *100-100-100-TM | 722 | 93 | 89 | 38.1 | 64 | 1 1/16 | 30 | 815 | 330 |
| **100-100-100 | 739 | 87 | 90 | 39.0 | 61 | 1 1/16 | 26 | 826 | 341 |
| 50-0-0 | 495 | 57 | 90 | 37.8 | 69 | 1 1/16 | 22 | 552 | 67 |
| @100-0-0 | 604 | 101 | 86 | 37.4 | 65 | 1 1/16 | 23 | 705 | 220 |
| 100#N (Sidedress-28% Liq) | 531 | 139 | 79 | 37.2 | 65 | 1 3/32 | 24 | 670 | 185 |
| 18+72+72 (Starter) | 426 | 53 | 89 | 37.9 | 64 | 1 3/32 | 20 | 479 | -6 |
| 18+72+72 (Starter) 50#N (Sidedress-Amo Nit) | 449 | 70 | 87 | 36.2 | 67 | 1 1/8 | 23 | 519 | 34 |
| 18+72+72 (Starter) 50#N (Sidedress-28% Liq) | 548 | 79 | 87 | 36.0 | 65 | 1 3/32 | 23 | 627 | 142 |
| 18+72+72 500# Fine Lime 50#N (Sidedress-Amo Nit) | 497 | 65 | 88 | 36.6 | 72 | 1 3/32 | 25 | 562 | 77 |

@ 50 lbs. nitrogen applied at planting and 50 lbs. sidedressed in July

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Harvey Lee
Location: One mile south of Qulin, Missouri
Soil Type:

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.8 | 154 | 230 | 820 | 4000 | 6.0 | 2.5 | 16.2 | 5.5 |
| Subsoil: | 1.0 | 50 | 230 | 860 | 3700 | 5.0 | 5.5 | 18.6 | 4.5 |

DPL # 15 Cotton planted May

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 212 | 418 | 34 | 39.0 | 74 | 1 1/8 | 34 | 630 | - |
| 0-100-100 | 158 | 435 | 27 | 39.2 | 72 | 1 3/32 | 32 | 593 | -37 |
| 25-100-100 | 159 | 477 | 25 | 38.3 | 76 | 1 1/8 | 33 | 636 | 6 |
| 50-100-100 | 168 | 650 | 21 | 39.4 | 69 | 1 1/8 | 37 | 818 | 188 |
| 100-100-100 | 135 | 690 | 16 | 38.0 | 69 | 1 1/8 | 39 | 825 | 195 |
| 100-100-100-TM | 204 | 630 | 25 | 39.5 | 72 | 1 1/8 | 41 | 834 | 204 |
| 100-50-100 | 201 | 719 | 22 | 38.8 | 70 | 1 1/8 | 40 | 920 | 290 |
| 100-25-100 | 189 | 682 | 22 | 38.1 | 72 | 1 3/32 | 40 | 871 | 241 |
| 100-0-100 | 213 | 687 | 24 | 38.3 | 71 | 1 3/32 | 38 | 900 | 270 |
| 100-100-50 | 168 | 675 | 20 | 38.4 | 70 | 1 1/8 | 38 | 843 | 213 |
| 100-100-25 | 182 | 684 | 21 | 38.8 | 70 | 1 1/8 | 40 | 866 | 236 |
| 100-100-0 | 138 | 569 | 20 | 38.1 | 73 | 1 3/32 | 40 | 707 | 77 |
| 50-50-50 | 194 | 661 | 23 | 38.7 | 68 | 1 1/8 | 39 | 855 | 225 |
| 25-25-25 | 262 | 488 | 35 | 40.2 | 69 | 1 1/8 | 34 | 750 | 120 |
| 100-50-50 | 208 | 711 | 23 | 39.0 | 71 | 1 1/8 | 40 | 919 | 289 |
| *100-100-100-TM | 180 | 714 | 20 | 38.3 | 70 | 1 3/32 | 39 | 894 | 264 |
| **100-100-100 | 155 | 673 | 19 | 38.3 | 73 | 1 3/32 | 37 | 828 | 168 |
| 50-0-0 | 153 | 490 | 24 | 39.9 | -- | 1 1/8 | 32 | 643 | 13 |
| 100-0-0 | 178 | 552 | 24 | 39.4 | 73 | 1 1/8 | 37 | 730 | 100 |

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Joe Burge
Location: Three miles south of Malden, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 0.9 | 238 | 220 | 360 | 700 | 6.5 | 2.0 | 5.7 | 5.8 |
| Subsoil: | 0.7 | 125 | 205 | 340 | 300 | 5.7 | 2.5 | 4.9 | 5.0 |

Rex cotton replanted May

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Hei ht of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 643 | 62 | 91 | 36.1 | 66 | 1 3/32 | 32 | 705 | - |
| 0-100-100 | 581 | 51 | 92 | 38.4 | 82 | 1 1/8 | 28 | 632 | -73 |
| 25-100-100 | 661 | 69 | 91 | 37.9 | 83 | 1 1/8 | 32 | 730 | 25 |
| 50-100-100 | 714 | 95 | 88 | 37.3 | 62 | 1 1/8 | 32 | 809 | 104 |
| @100-100-100 | 675 | 110 | 86 | 36.3 | 63 | 1 1/8 | 33 | 785 | 80 |
| @100-100-100-TM | 795 | 111 | 88 | 37.4 | 62 | 1 1/8 | 36 | 906 | 201 |
| @100-50-100 | 642 | 157 | 80 | 35.1 | 65 | 1 1/8 | 34 | 799 | 94 |
| @100-25-100 | 658 | 153 | 81 | 35.4 | 65 | 1 1/8 | 34 | 811 | 106 |
| @100-0-100 | 715 | 155 | 82 | 35.5 | 64 | 1 3/32 | 36 | 870 | 165 |
| @100-100-50 | 698 | 173 | 80 | 35.3 | 64 | 1 1/8 | 36 | 871 | 166 |
| @100-100-25 | 756 | 185 | 80 | 35.4 | 63 | 1 5/32 | 31 | 941 | 236 |
| @100-100-0 | 746 | 127 | 86 | 36.0 | 66 | 1 1/16 | 30 | 873 | 168 |
| 50-50-50 | 622 | 119 | 84 | 36.6 | 70 | 1 3/32 | 33 | 741 | 36 |
| 25-25-25 | 683 | 94 | 88 | 36.7 | 72 | 1 3/32 | 31 | 777 | 72 |
| 100-50-50 | 716 | 120 | 86 | 35.8 | 65 | 1 1/8 | 34 | 836 | 131 |
| *100-100-100-TM | 717 | 142 | 84 | 35.6 | 65 | 1 1/8 | 38 | 859 | 154 |
| **100-100-100 | 573 | 160 | 78 | 35.7 | 74 | 1 3/32 | 39 | 733 | 28 |
| 50-0-0 | 800 | 135 | 86 | 36.1 | 72 | 1 1/8 | 37 | 935 | 230 |
| @100-0-0 | 888 | 188 | 83 | 37.6 | 72 | 1 1/16 | 34 | 1076 | 371 |

@ 50 lbs. nitrogen applied at planting and 50 lbs. sidedressed in July

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Charles Gardner
Location: Matthews, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.3 | 195 | 320 | 280 | 1350 | 6.4 | 2.0 | 7.0 | 5.6 |
| Subsoil: | 0.9 | 103 | 150 | 230 | 1000 | 6.4 | 2.0 | 5.7 | 5.6 |

Fox #4 cotton replanted May 23

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 514 | 306 | 63 | 34.2 | 70 | 1 1/8 | 42 | 820 | - |
| 0-100-100 | 463 | 304 | 60 | 34.0 | 67 | 1 1/8 | 47 | 767 | -53 |
| 25-100-100 | 384 | 358 | 52 | 35.1 | 65 | 1 1/8 | 45 | 742 | -78 |
| 50-100-100 | 428 | 428 | 50 | 34.1 | 67 | 1 1/8 | 48 | 856 | 36 |
| 100-100-100 | 359 | 323 | 53 | 34.0 | 65 | 1 5/32 | 49 | 682 | -138 |
| 100-100-100-TM | 414 | 439 | 49 | 34.0 | 68 | 1 1/8 | 47 | 853 | 33 |
| 100-50-100 | 413 | 479 | 46 | 33.4 | 66 | 1 5/32 | 53 | 892 | 72 |
| 100-25-100 | 384 | 436 | 47 | 32.5 | 66 | 1 5/32 | 53 | 820 | 0 |
| 100-0-100 | 365 | 461 | 44 | 33.4 | 64 | 1 1/8 | 52 | 826 | 6 |
| 100-100-50 | 452 | 452 | 50 | 33.2 | 67 | 1 5/32 | 52 | 904 | 84 |
| 100-100-25 | 412 | 412 | 50 | 33.3 | 65 | 1 5/32 | 55 | 824 | 4 |
| 100-100-0 | 376 | 453 | 45 | 33.3 | 65 | 1 5/32 | 52 | 829 | 9 |
| 50-50-50 | 436 | 413 | 51 | 32.9 | 65 | 1 5/32 | 57 | 849 | 29 |
| 25-25-25 | 491 | 426 | 54 | 33.0 | 63 | 1 5/32 | 55 | 917 | 97 |
| 100-50-50 | 394 | 430 | 48 | 33.3 | 65 | 1 5/32 | 55 | 824 | 4 |
| *100-100-100-TM | 337 | 280 | 55 | 31.9 | 63 | 1 1/8 | 60 | 617 | -203 |
| **100-100-100 | 343 | 390 | 47 | 33.0 | 62 | 1 5/32 | 59 | 733 | -87 |
| 50-0-0 | 469 | 359 | 57 | 32.3 | 63 | 1 5/32 | 53 | 828 | 8 |
| 100-0-0 | 517 | 476 | 52 | 33.2 | 64 | 1 1/8 | 51 | 993 | 173 |

* Trace minerals added to fertilizer in process of granulation.

** Supplied by 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOIL TEST CORRELATION

Cooperator: Sikeston Experiment Field
Location: One mile south of Sikeston, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.6 | 236 | 570 | 190 | 1600 | 6.3 | 3.0 | 8.4 | 5.6 |
| Subsoil: | 1.0 | 142 | 300 | 280 | 1400 | 5.6 | 3.0 | 8.1 | 5.2 |

Delfos Cotton planted April 26

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 583 | 214 | 73 | 35.6 | 61 | 1 5/32 | 35 | 797 | - |
| 0-100-100 | 643 | 183 | 78 | 35.6 | 61 | 1 7/32 | 37 | 826 | 29 |
| 25-100-100 | 798 | 144 | 85 | 36.0 | 59 | 1 3/16 | 37 | 942 | 145 |
| 50-100-100 | 921 | 129 | 88 | 36.0 | 57 | 1 7/32 | 39 | 1050 | 253 |
| @100-100-100 | 948 | 156 | 86 | 36.0 | 56 | 1 3/16 | 39 | 1104 | 307 |
| @100-100-100-TM | 724 | 262 | 73 | 34.9 | 57 | 1 3/16 | 41 | 986 | 189 |
| @100-50-100 | 839 | 181 | 82 | 35.4 | 57 | 1 5/32 | 37 | 1020 | 223 |
| @100-25-100 | 796 | 163 | 83 | 34.7 | 60 | 1 3/16 | 34 | 959 | 162 |
| @100-0-100 | 736 | 185 | 80 | 35.1 | 59 | 1 3/16 | 35 | 921 | 124 |
| @100-100-50 | 869 | 146 | 86 | 35.1 | 58 | 1 3/16 | 34 | 1015 | 218 |
| @100-100-25 | 746 | 188 | 80 | 35.3 | 56 | 1 5/32 | 35 | 934 | 137 |
| @100-100-0 | 767 | 172 | 82 | 35.2 | 58 | 1 3/16 | 33 | 939 | 142 |
| 50-50-50 | 587 | 187 | 76 | 35.2 | 57 | 1 3/16 | 36 | 774 | -23 |
| 25-25-25 | 532 | 222 | 71 | 34.9 | 60 | 1 3/16 | 36 | 754 | -43 |
| 100-50-50 | 513 | 270 | 66 | 34.9 | 58 | 1 3/16 | 47 | 783 | -14 |
| *100-100-100-TM | 678 | 273 | 71 | 35.1 | 57 | 1 3/16 | 45 | 951 | 154 |
| **100-100-100 | 507 | 299 | 63 | 34.9 | 58 | 1 3/16 | 45 | 806 | 9 |
| 50-0-0 | 603 | 268 | 69 | 34.9 | 59 | 1 7/32 | 39 | 871 | 74 |
| @100-0-0 | 338 | 294 | 54 | 34.4 | 61 | 1 3/16 | 40 | 632 | -165 |

@ 50 lbs. nitrogen applied at planting and 50 lbs. sidedressed in July

* Trace minerals added to fertilizer in process of manufacture.

** Supplied with 15-15-15 at time of planting.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## SOURCE OF NITROGEN

Sikeston Experiment Field
Location: One mile south of Sikeston, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.6 | 236 | 570 | 190 | 1600 | 5.3 | 3.0 | 8.4 | 5.6 |
| Subsoil: | 1.0 | 142 | 300 | 280 | 1400 | 5.6 | 3.0 | 8.1 | 5.2 |

Delfos cotton replanted May

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 583 | 214 | 73 | 35.6 | 61 | 1 5/32 | 35 | 797 | - |
| 0+100+100 | 643 | 183 | 78 | 35.6 | 61 | 1 7/32 | 37 | 826 | 29 |
| 100+100+100 (Anhydrous) | 778 | 217 | 78 | 35.0 | 56 | 1 5/32 | 40 | 995 | 198 |
| 100+100+100 (Urea) | 826 | 242 | 77 | 35.0 | 58 | 1 3/16 | 39 | 1068 | 271 |
| 100+100+100 (Amo Nitrate) | 948 | 156 | 86 | 36.0 | 56 | 1 3/16 | 39 | 1104 | 307 |
| 100+100+100 (Sodium Nitrate) | 704 | 209 | 77 | 34.3 | 56 | 1 3/16 | 40 | 913 | 116 |
| 100+100+100 (Amo Sulphate) | 811 | 228 | 78 | 35.8 | 56 | 1 5/32 | 40 | 1039 | 242 |

Cooperator: Joe Burge
Location: Three miles south of Malden
Soil Type:

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 0.9 | 238 | 220 | 360 | 700 | 6.5 | 2.0 | 5.7 | 5.8 |
| Subsoil; | 0.7 | 125 | 205 | 340 | 300 | 5.7 | 2.5 | 4.9 | 5.0 |

Rex cotton planted May

| *Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|
| No Treatment | 643 | 62 | 91 | 36.1 | 66 | 1 3/32 | 705 | - |
| 0+100+100 | 581 | 51 | 92 | 38.9 | 57 | 1 1/8 | 632 | -73 |
| 100# N (Anhydrous Ammonia) | 616 | 238 | 72 | 38.9 | 57 | 1 1/16 | 854 | 149 |
| 100#N (Urea) | 555 | 221 | 72 | 38.3 | 61 | 1 1/16 | 776 | 71 |
| 100#N (Ammonium Nitrate) | 588 | 212 | 74 | 38.7 | 60 | 1 1/16 | 800 | 95 |
| 100#N (Sodium Nitrate) | 533 | 235 | 69 | 38.6 | 61 | 1 1/16 | 768 | 63 |
| 100#N (Ammonium Sulphate) | 483 | 196 | 71 | 38.7 | 64 | 1 1/16 | 679 | -26 |

* All plots 18+72+72 starter banded at planting

## SOIL FERTILITY EXPERIMENT - COTTON - 1960

### SOURCE OF NITROGEN

Bragg City Experiment Field
Location: One mile south of Bragg City

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.9 | 224+ | 400 | 764 | 6200 | 6.3 | 3.0 | 22.2 | 5.7 |
| Subsoil: | 1.5 | 122 | 320 | 760 | 6200 | 5.8 | 2.5 | 21.6 | 5.6 |

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 96 | 52 | 65 | 38.7 | 91 | 1 3/32 | 15 | 148 | |
| 0+100+100 | 111 | 57 | 66 | 36.7 | 79 | 1 3/32 | 19 | 168 | 20 |
| 100+100+100 (anhydrous amm) | 111 | 91 | 56 | 37.3 | 72 | 1 1/16 | 21 | 202 | 54 |
| 100+100+100 (urea) | 264 | 108 | 71 | 34.0 | 75 | 1 1/8 | 22 | 372 | 224 |
| 100+100+100 (amm. nitrate) | 361 | 99 | 78 | 37.8 | 73 | 1 1/8 | 21 | 460 | 312 |
| 100+100+100 (sodium nitrate) | 238 | 157 | 60 | 38.3 | 76 | 1 3/32 | 23 | 395 | 247 |
| 100+100+100 (amm. sulphate) | 357 | 78 | 82 | 37.2 | 75 | 1 3/32 | 22 | 435 | 287 |

Ammonium nitrate continues to be the most reliable source of nitrogen in the production of cotton. Ammonium sulfate has given good results on most soil types. Urea has a tendency to delay the maturity as compared to the other sources but has produced satisfactorily on the heavier soils. Anhydrous ammonia is a good source, providing the application is made so that the ammonia is retained by the soil. Poor soil conditions that prevent efficient retention of ammonia have probably been responsible for some of the less satisfactory results have been obtained.

## SOIL FERTILITY EXPERIMENT - COTTON - 1960

### TRACE ELEMENTS

Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey Clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.1 | 232 | 400 | 800 | 6200 | 5.9 | 3.0 | 22.3 | 5.7 |
| Subsoil: | 1.7 | 144 | 280 | 760 | 6000 | 5.8 | 2.5 | 21.0 | 5.7 |

Rex cotton replanted May 17.

| *Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Traces | 463 | 142 | 77 | 36.0 | 67 | 1 1/16 | 24 | 605 | |
| 150# Traces (less iron) | 481 | 128 | 79 | 37.8 | 67 | 1 3/32 | 22 | 609 | 4 |
| 150# Traces (less copper) | 456 | 121 | 79 | 37.1 | 66 | 1 3/32 | 23 | 577 | -28 |
| 150# Traces (less zinc) | 444 | 77 | 85 | 36.9 | 67 | 1 3/32 | 23 | 521 | -84 |
| 150# Traces (less manganese) | 448 | 159 | 74 | 37.3 | 64 | 1 1/16 | 24 | 607 | 2 |
| 150# Traces (less boron) | 434 | 154 | 74 | 36.8 | 64 | 1 3/32 | 26 | 588 | -18 |
| 150# Traces (less magnesium) | 457 | 125 | 79 | 37.5 | 65 | 1 3/32 | 24 | 582 | -23 |
| 150# Traces (complete mix) | 424 | 168 | 72 | 37.5 | 63 | 1 3/32 | 25 | 592 | -13 |

* 100+50+50 applied to all plots.

## SOIL FERTILITY EXPERIMENT - COTTON - 1960

### TRACE ELEMENTS

Sikeston Experiment Field
Location: One mile south of Sikeston, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.6 | 236 | 570 | 190 | 1600 | 6.3 | 3.0 | 8.4 | 5.6 |
| Subsoil: | 1.0 | 142 | 300 | 280 | 1400 | 5.6 | 3.0 | 8.1 | 5.2 |

| *Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 583 | 214 | 73 | 35.6 | 61 | 1 5/32 | 35 | 797 | |
| No Traces | 587 | 187 | 76 | 35.2 | 60 | 1 3/16 | 32 | 774 | -23 |
| 150# Traces (less iron) | 631 | 256 | 71 | 35.4 | 58 | 1 3/16 | 43 | 887 | 90 |
| 150# Traces (less copper) | 744 | 204 | 79 | 35.4 | 57 | 1 3/16 | 34 | 948 | 151 |
| 150# Traces (less zinc) | 699 | 242 | 74 | 35.8 | 57 | 1 3/16 | 40 | 941 | 144 |
| 150# Traces (less Mn) | 817 | 207 | 80 | 35.6 | 60 | 1 5/32 | 40 | 1024 | 227 |
| 150# Traces (less Boron) | 757 | 219 | 78 | 35.3 | 59 | 1 3/16 | 45 | 976 | 179 |
| 150# Traces (less Mg) | 796 | 151 | 84 | 34.4 | 56 | 1 3/16 | 43 | 947 | 150 |
| 150# Traces (complete mixture) | 761 | 200 | 79 | 35.0 | 59 | 1 3/16 | 40 | 961 | 164 |
| 500# Fine Lime | 768 | 224 | 77 | 35.8 | 57 | 1 5/32 | 37 | 992 | 195 |

* 50+50+50 starter added to all plots at time of planting except no treatment plot.

The two preceding experiments were established to test the need for individual trace elements in cotton production. This was a survey type of study intended to serve as a guide for more detailed research. The data from Bragg City show no consistent response to any of these elements. The plots at Sikeston show increases from trace elements other than manganese. Results from other experiments have been so variable that application of trace elements is not indicated, as a regular practice. It appears desirable for tests to be conducted by individual planters on their own land.

SOIL FERTILITY EXPERIMENT - COTTON - 1960

COMPARISON OF DRY AND LIQUID FERTILIZERS

Cooperator: Joe Burge
Location: Three miles south of Malden, Missouri
Soil Type: Dexter sandy loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 0.9 | 238 | 220 | 360 | 700 | 6.5 | 2.0 | 5.7 | 5.8 |
| Subsoil: | 0.7 | 125 | 205 | 340 | 300 | 5.7 | 2.5 | 4.9 | 5.0 |

Rex cotton planted May

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 643 | 62 | 91 | 36.1 | 66 | 1 3/32 | 32 | 705 | - |
| 50+50+50 (Dry) | 622 | 119 | 84 | 36.6 | 70 | 1 3/32 | 33 | 741 | 36 |
| 50+50+50 (Liquid) | 707 | 185 | 79 | 37.8 | 75 | 1 3/32 | 34 | 892 | 187 |
| 100+50+50 (Dry) | 716 | 120 | 86 | 35.8 | 65 | 1 1/8 | 34 | 836 | 131 |
| 100+50+50 (Liquid) | 765 | 154 | 83 | 36.5 | 71 | 1 3/32 | 34 | 919 | 214 |
| Comparison of Ammonium Nitrate and Liquid Nitrogen Side Dressed | | | | | | | | | |
| *50#N-(32% Liquid) | 614 | 132 | 82 | 33.4 | 75 | 1 1/8 | 38 | 746 | 41 |
| *50#N-(Amo Nitrate) | 647 | 134 | 83 | 33.1 | 74 | 1 3/32 | 42 | 781 | 76 |
| *100#N-(32% Liquid) | 596 | 135 | 82 | 342 | 73 | 1 5/32 | 45 | 731 | 26 |
| *100#N-(Amo Nitrate) | 660 | 158 | 81 | 35.2 | 77 | 1 1/8 | 42 | 818 | 113 |

* 18+72+72 applied as starter at planting.

Liquid vs. dry fertilizers: Mixed liquid and dry fertilizers of the same ratio were compared at the same rate of nutrient application per acre. Both types of materials increased yields but there was no significant difference in the response.

Ammonium nitrate and 32 percent liquid nitrogen (non-pressure) were applied at the same rates of nitrogen per acre. There was no difference in the amount of response.

## ANHYDROUS AMMONIA

Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey Clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.6 | 320 | 320 | 880 | 6200 | 6.3 | 1.5 | 21.1 | 6.2 |
| Subsoil: | 1.7 | 160 | 260 | 840 | 6200 | 5.6 | 2.0 | 21.3 | 6.3 |

Dixie King Cotton replanted May 17.

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height Of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No Treatment | 183 | 25 | 88 | 35.7 | 74 | 1 1/16 | 22 | 208 | |
| 100#N Anhydrous (4 knives) | 286 | 123 | 70 | 37.1 | 72 | 1 1/16 | 28 | 409 | 201 |
| 100#N Anhydrous (3 knives) | 269 | 130 | 67 | 36.2 | 67 | 1 1/16 | 26 | 399 | 191 |
| 50#N Anhydrous (4 knives) | 345 | 171 | 67 | 36.1 | 63 | 1 3/32 | 28 | 516 | 308 |

Spacing of anhydrous ammonia knives: Anhydrous ammonia was applied to the heavy soil at Bragg City. The application made with two knives per row (one-half the quantity per knife) produced about 100 pounds more lint cotton than where all of the ammonia was applied with one knife per middle.

The time and rate of application of complete fertilizer was included in an experiment at Sikeston. The starter application of 100+100+100 produced the highest yield, compared to split applications of this and higher rates of the complete fertilizer.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960
## METHODS OF APPLICATION

Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey Clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.2 | 256 | 320 | 760 | 6200+ | 6.2 | 2.0 | 21.1 | 6.3 |
| Subsoil: | 1.4 | 160 | 300 | 800 | 6200+ | 5.7 | 2.5 | 21.7 | 5.6 |

Rex cotton replanted May 28.

| Soil Treatment | | | | Lint | Lint | % Lint | % Lint | Bolls | | Height of | Lbs. Lint | Increase |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plowdown | Starter | Side dress | Comments | 1st. Pick | 2nd. Pick | 1st. Pick | Turn Out | Per Pound | Staple | Plant Inches | Per Acre | Over Check |
| Bedded Ground | | | | | | | | | | | | |
| | | | No Treatment | 167 | 31 | 84 | 38.2 | 79 | 1 3/32 | 17 | 198 | |
| | 48+48+ 8 | | | 517 | 77 | 87 | 36.3 | 74 | 1 1/8 | 21 | 594 | 396 |
| | 12+12+12 | 36+36+36 | | 354 | 105 | 77 | 37.3 | 69 | 1 1/8 | 23 | 459 | 261 |
| 48+48+48 | | | Broadcast and rebed | 340 | 66 | 84 | 36.7 | 76 | 1 1/8 | 21 | 406 | 208 |
| 36+36+36 | 12+12+12 | | Broadcast and rebed | 359 | 77 | 83 | 37.6 | 80 | 1 1/8 | 21 | 436 | 238 |
| 0+48+0 | 48+0+48 | | Banded and rebed | 392 | 135 | 74 | 36.9 | 74 | 1 3/32 | 24 | 527 | 329 |
| 0+0+48 | 48+48+0 | | Banded and rebed | 477 | 84 | 85 | 37.1 | 73 | 1 1/8 | 22 | 561 | 363 |
| | 48+48+48 | 40# N July | Side dressed next to row | 526 | 156 | 77 | 36.9 | 72 | 1 1/8 | 24 | 682 | 484 |
| | 48+48+48 | 80# N July | Side dressed next to row | 440 | 124 | 78 | 37.2 | 71 | 1 3/32 | 27 | 564 | 366 |
| | 48+48+48 | 40# N July | Side dressed in middle | 507 | 131 | 79 | 36.2 | 73 | 1 3/32 | 24 | 638 | 440 |
| 48+48+48 | | | Wide band under bed | 499 | 51 | 91 | 36.5 | 80 | 1 3/16 | 21 | 550 | 352 |
| 48+48+48 | | | Narrow band under bed | 449 | 38 | 92 | 37.4 | 72 | 1 3/16 | 19 | 487 | 289 |
| | 48+48+48 | | Broadcast and Harrow in before planting | 347 | 61 | 85 | 377 | 78 | 1 1/8 | 20 | 408 | 210 |
| 48+48+48 | 48+48+48 | | Plowdown fertilizer in band under bed | 469 | 116 | 80 | 36.3 | 71 | 1 3/32 | 24 | 585 | 387 |
| 48+48+48 | 48+48+48 | 48+48+48 | Plow down fertilizer in band under bed | 549 | 123 | 82 | 37.3 | 70 | 1 1/8 | 24 | 672 | 474 |
| | 48+48+48 | | Liquid 8-8-8 | 479 | 100 | 83 | 36.5 | 69 | 1 1/8 | 24 | 579 | 381 |
| | 48+48+48 | 40# N July | Starter Liquid 8-8-8 Sidedress liquid uran | 631 | 157 | 80 | 36.9 | 70 | 1 1/8 | 27 | 788 | 590 |
| | 48+48+48 | 80# N July | Starter liquid 8-8-8 Sidedress liquid uran | 592 | 183 | 76 | 36.4 | 69 | 1 3/32 | 26 | 775 | 577 |
| Flat Planted | | | | | | | | | | | | |
| | | | No treatment | 147 | 51 | 74 | 38.3 | 80 | 1 1/8 | 20 | 198 | |
| | 48+48+48 | | | 458 | 98 | 82 | 37.3 | 68 | 1 5/32 | 19 | 556 | 358 |
| | 12+12+12 | 36+36+36 | | 406 | 155 | 72 | 37.9 | 77 | 1 1/8 | 21 | 561 | 363 |
| 36+36+36 | 12+12+12 | | | 372 | 58 | 87 | 37.7 | 76 | 1 1/8 | 22 | 430 | 232 |
| 48+48+48 | | | | 334 | 78 | 72 | 37.0 | 80 | 1 5/32 | 21 | 412 | 214 |

## Methods of Fertilizer Application

| Soil Treatment | | | | Bragg City | | Bell City | Malden | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1960 Tot. Lint | 4 yr. Ave. Tot. Lint | 3yr. Ave. Tot. Lint. | 4 yr. avg. Non-irr. Total Lint | Irr. Total Lint |
| Bed on or Plowdown | Starter | Sidedress | Comments | Bedded Ground | | Bedded Ground | Flat Planted | |
| No Treatment | | | | 198 | 256 | 662 | 244 | 347 |
| | 48+48+48 | | | 594 | 514 | 724 | 503 | 675 |
| | 12+12+12 | 36+36+36 | | 459 | 467 | 685 | 392 | 649 |
| 48+48+48 | | | Broadcast and rebed | 406 | 385 | 709 | 413 | 556 |
| 36+36+36 | 12+12+12 | | | 436 | 447 | 746 | 405 | 589 |
| 0+48+0 | 48+0+48 | | | 427 | 498 | 772 | 440 | 607 |
| 0+0+48 | 48+48+0 | | | 561 | 504 | 757 | 374 | 575 |
| | 48+48+48 | 40# N-July | Sidedressed next to row | 682 | 610 | 797 | 400 | 605 |
| | 48+48+48 | 80# N-July | Sidedressed next to row | 564 | 564 | 869 | 413 | 598 |
| | 48+48+48 | 40# N-July | Sidedressed in middle | 638 | 582* | 748 | 413 | 587 |
| 48+48+48 | | | 6" wide band under bed | 550 | 582** | | | |
| 48+48+48 | | | 1" Narrow band under bed | 487 | 539** | | | |
| | 48+48+48 | | Broadcast and harrow in before planting | 408 | 366* | 682 | | |
| 48+48+48 | 48+48+48 | | Band under bed and starter | 585 | 529 | | 395 | 534 |
| 48+48+48 | 48+48+48 | 48+48+48 | Band under bed, starter and sidedress | 672 | 593 | 832 | 458 | 549 |
| | 48+48+48 | | Liquid 8-8-8 | 579 | --- | 744 | 458 | 582 |
| | 48+48+48 | 40# N-July | Starter liquid 8-8-8, Sidedress Uran | 788 | 718 | | | |
| | 48+48+48 | 80# N-July | Starter Liquid 8-8-8, Sidedress Uran | 775 | --- | | | |
| | | | | Flat Planted | | | | |
| No Treatment | | | | 198 | 290 | | | |
| | 48+48+48 | | | 556 | 480 | | | |
| | 12+12+12 | 36+36+36 | | 561 | 482 | | | |
| 36+36+36 | 12+12+12 | | | 430 | 417 | | | |
| 48+48+48 | | | | 412 | 351 | | | |

* 3 year average ** 2 year average

The method and placement of a given amount of fertilizer influences the yield of lint cotton. Applying the fertilizer (48+48+48) under the bed prior to planting and as a starter produced high yields over a 3 to 5 year period on the heavier soils of southeast Missouri.

Application of 48+48+48 starter plus 40 to 80 pounds of nitrogen, sidedressed, produced maximum yields. Placing this nitrogen near the row or between the rows gave similar response.

# SOIL FERTILITY EXPERIMENT - COTTON - 1960

## TIME AND RATE OF FERTILIZER APPLICATION

Sikeston Experiment Field
Location: One mile south of Sikeston, Missouri
Soil Type: Dexter Sandy Loam

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 1.6 | 236 | 570 | 190 | 1600 | 6.3 | 3.0 | 8.4 | 5.6 |
| Subsoil: | 1.0 | 142 | 300 | 280 | 1400 | 5.6 | 3.0 | 8.1 | 5.2 |

Delfos cotton replanted May

| Soil Treatment | | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|---|
| Starter | Side Dress | | | | | | | | | |
| No Treatment | | 583 | 214 | 73 | 35.6 | 61 | 1 5/32 | 35 | 797 | |
| None | 50+50+50 | 479 | 237 | 67 | 34.5 | 59 | 1 3/16 | 40 | 716 | -81 |
| 25+25+25 | 50+50+50 | 764 | 181 | 81 | 35.5 | 58 | 1 3/16 | 34 | 945 | 148 |
| 25+25+25 | 75+75+75 | 734 | 207 | 78 | 35.6 | 59 | 1 3/16 | 33 | 941 | 144 |
| 25+25+25 | 150+150+150 | 651 | 247 | 73 | 35.4 | 58 | 1 3/16 | 36 | 898 | 101 |
| 12+48+48 | 33+0+0 | 607 | 177 | 77 | 35.0 | 59 | 1 5/32 | 37 | 784 | -13 |
| 12+48+48 | 66+0+0 | 753 | 177 | 81 | 35.8 | 60 | 1 5/32 | 34 | 930 | 133 |
| 18+72+72 | 33+0+0 | 754 | 161 | 82 | 35.4 | 59 | 1 5/32 | 38 | 915 | 118 |
| 18+72+72 | 66+0+0 | 774 | 145 | 84 | 35.2 | 59 | 1 3/16 | 39 | 919 | 122 |
| 18+72+72 | 100+0+0 | 792 | 170 | 82 | 35.3 | 56 | 1 5/32 | 44 | 962 | 165 |
| 50+50+50 | None | 587 | 187 | 76 | 35.2 | 57 | 1 3/16 | 36 | 774 | -23 |
| 100+100+100 | None | 948 | 156 | 86 | 36.0 | 56 | 1 3/16 | 39 | 1104 | 307 |

### Soil Treatment and Land Grading

Considerable interest has developed among farmers of southeast Missouri in land grading for irrigation and improvement of drainage. In providing the grade desired, deep cuts and fills are frequently necessary. Questions arise as to what effect this operation may have on crops that follow and on the fertilization program.

The results given below give yields of lint cotton from a field (loam) which was put to grade in 1958. There was little difference between yields obtained on the no-treatment plots for the two-year period. The filled and cut portions of the field responded equally well to the fertilizer applications.

This field has about the same clay content in its subsoil as in the original topsoil, which may account for the favorable results. Had the subsoil contained more sand, the results may not have been as good. This points to the need for a thorough survey of the subsoil before land grading, where deep cuts are to be made. Chemical soil tests of the exposed subsoil will aid in determining the fertilizer applications required after grading.

Soil Treatment and Land Grading (Loam Soil-Roth Farm)

| | 1959 Total Lint | | 1960 Total Lint | | 2 yr. average Total Lint | |
|---|---|---|---|---|---|---|
| | Filled | Cut | Filled | Cut | Filled | Cut |
| No Fertilizer | 577 | 484 | 431 | 485 | 504 | 485 |
| 25+25 25 | 778 | 589 | 593 | 548 | 685 | 568 |
| 50+50+50 | 864 | 732 | 704 | 661 | 784 | 697 |
| 100+100+100 | 752 | 840 | 900 | 826 | 826 | 833 |
| 100+50+50 | 877 | 885 | 790 | 804 | 834 | 845 |

FINE LIME AND GYPSUM

Cooperator: Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.5 | 280 | 360 | 800 | 6200 | 6.3 | 2.0 | 21.3 | 6.1 |
| Subsoil: | 1.5 | 46 | 290 | 760 | 6200 | 5.5 | 2.5 | 21.5 | 5.3 |

Rex cotton replanted May 28

| Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|
| No Treatment | 119 | 118 | 36.9 | 79 | 1 1/8 | 18 | 237 | |
| 60+60+60 | 367 | 124 | 37.3 | 70 | 1 1/8 | 25 | 491 | 254 |
| 60+60+60 (2 ton dolomite 1956) | 278 | 116 | 37.2 | 69 | 1 1/8 | 24 | 394 | 157 |
| 60+60+60 (1000# Gypsum 1956) | 360 | 131 | 37.3 | 70 | 1 3/32 | 26 | 491 | 254 |
| 60+60+60 (300# Fine Lime Annually) | 313 | 151 | 37.3 | 70 | 1 3/32 | 25 | 464 | 227 |
| 60+60+60 (Liquid 10-10-10) | 295 | 98 | 37.9 | 67 | 1 1/8 | 25 | 393 | 156 |

Limestone applications for cotton: Applications of different liming materials were made on four soils to study the influence of source, rate of application, and fineness of grind. At the Bragg City field (pH 6.2) the addition of 3 and 6 tons of fine calcium limestone in 1958 increased the yield of lint cotton in 1960 by 56 and 115 pounds of lint cotton per acre, respectively. Little response was obtained from dolomitic stone at these rates, but a 12 ton application increased yields 61 pounds per acre. There was no response at the Bragg City field to gypsum applied in 1956. There was little response from lime applied before cotton at the other three locations. These results, together with those obtained in previous years indicated that there may be little direct effect of lime on cotton yields the first year. When soils are very acid (below pH 5), or very low in calcium, the efficiency of absorption of fertilizer nutrients (particularly phosphorus) by cotton is decreased in a long-time soil fertility program. The residual acidity from nitrogen will make soils more acid and increase the need for liming materials. When cotton is grown in sequence with soybeans or other legume crops, there can be a secondary effect on cotton production through greater fixation of nitrogen by the legume bacteria and an increase in soil organic matter.

## SOIL FERTILITY EXPERIMENT - COTTON - 1960

### RATE AND SOURCE OF LIMESTONE

Cooperator: Bragg City Experiment Field
Location: One mile south of Bragg City
Soil Type: Sharkey clay

| Soil Test: | OM | P | K | Mg | Ca | pH | H | CEC | Salt pH |
|---|---|---|---|---|---|---|---|---|---|
| Topsoil: | 2.5 | 260 | 450 | 760 | 6200 | 6.2 | 1.5 | 20.7 | 6.2 |
| Subsoil: | 1.5 | 128 | 220 | 800 | 6200 | 5.5 | 2.5 | 21.6 | 5.6 |

Dixie King cotton replanted May 17

| * Soil Treatment | Lint 1st. Pick | Lint 2nd. Pick | % Lint 1st. Pick | % Lint Turn Out | Bolls Per Pound | Staple | Height of Plant Inches | Lbs. Lint Per Acre | Increase Over Check |
|---|---|---|---|---|---|---|---|---|---|
| No lime | 406 | 67 | 86 | 35.5 | 61 | 1 3/32 | 28 | 473 | |
| 3 ton fine lime | 472 | 57 | 89 | 35.7 | 61 | 1 1/16 | 28 | 529 | 56 |
| 6 ton fine lime | 532 | 56 | 90 | 35.5 | 62 | 1 3/32 | 27 | 588 | 115 |
| 12 ton fine lime | 506 | 51 | 91 | 36.2 | 58 | 1 3/32 | 26 | 557 | 84 |
| 3 ton dolomite lime | 426 | 52 | 89 | 35.0 | 57 | 1 3/32 | 27 | 478 | 5 |
| 6 ton dolomite lime | 407 | 56 | 88 | 35.6 | 61 | 1 3/32 | 27 | 463 | -10 |
| 12 ton dolomite lime | 481 | 53 | 90 | 36.0 | 66 | 1 1/16 | 28 | 534 | 61 |

* Fertilizer applied to all plots 100+50+50. Limestone applied in October 1958, disced in and bedded.

## CORN SOIL FERTILITY EXPERIMENTS

Soil fertility experiments with corn were conducted at three locations in southeast Missouri. Two of the locations on the sand and clay soils included experiments which were part of a regional project of the North Central States on the response of corn to time and rate of application of different sources of nitrogen. Results from this test indicate an 80-pound application of nitrogen per acre was more profitable than a 40-pound application. Side dressing the nitrogen on this sandy soil gave approximately the same increases in yield as plowing the nitrogen down before planting. On the clay loam soil the yields were much higher, with 80 pounds of nitrogen per acre side dressed giving a yield increase of 86 bushels per acre. Side dressing the nitrogen was superior on this soil. The test on the Kalkbrenner farm indicated a 50+50+50 starter fertilizer was probably the most profitable combination in 1960.

Fertilizer Treatments for Corn

| | Kalkbrenner Farm-Waverly loam | | |
|---|---|---|---|
| Soil Treatment | Weight per ear Lbs. | Yield Bu. | Increase over check Bu. |
| None | .503 | 88 | |
| 0+100+100 | .501 | 82 | -6 |
| 100+100+100 | .552 | 107 | 19 |
| 200+100+100 | .553 | 121 | 33 |
| 150+100+100+Traces | .559 | 115 | 27 |
| 150+50+100 | .573 | 114 | 26 |
| 150+0+100 | .570 | 126 | 38 |
| 150+100+50 | .603 | 127 | 39 |
| 50+50+50 | .564 | 119 | 31 |
| 25+25+25 | .584 | 111 | 23 |
| 150+0+0 | .563 | 119 | 31 |
| 150+100+0 | .549 | 107 | 19 |

14,000 plants per acre

Source, Rate, and Time of Application of Nitrogen for Corn

| | | Burge Farm-Sandy loam | | Roth Farm-Clay loam | |
|---|---|---|---|---|---|
| Soil Treatment* | Time of Application | Yield Bu. | Increase over check Bu. | Yield Bu. | Increase over check Bu. |
| None | | 26 | -- | 45 | -- |
| 40 lbs.N-nitrate | Spring | 50 | 24 | 72 | 27 |
| 80 lbs.N-nitrate | Spring | 59 | 33 | 111 | 67 |
| 40 lbs.N-ammonia | Spring | 43 | 17 | 72 | 27 |
| 80 lbs.N-ammonia | Spring | 57 | 31 | 111 | 66 |
| 40 lbs.N-nitrate | Sidedress | 50 | 24 | 102 | 57 |
| 80 lbs.N-nitrate | Sidedress | 58 | 32 | 131 | 86 |
| 40 lbs.N-ammonia | Sidedress | 43 | 17 | 90 | 45 |
| 80 lbs.N-ammonia | Sidedress | 55 | 29 | 124 | 79 |

*All plots received a basic treatment of 0+87+87

Effect on Corn Yields of Methods of Applying Anhydrous Ammonia in Comparison With Effect of Ammonium Nitrate

Burge Farm-Sandy loam soil

| Soil Treatment | Bushels of Grain |
|---|---|
| 50 lbs. N-Anhydrous* | 54 |
| 100 lbs.N-Anhydrous* | 46 |
| 150 lbs.N-Anhydrous* | 46 |
| 100 lbs.N-Anhydrous** | 52 |
| 150 lbs.N-Anhydrous** | 56 |
| 50 lbs.N-Ammonium nitrate | 48 |
| 100 lbs.N-Ammonium nitrate | 63 |
| 150 lbs.N-Ammonium nitrate | 61 |
| 200 lbs.N-Ammonium nitrate | 61 |
| 100 lbs.N-Urea | 61 |

Starter fertilizer 18+72+72
*Two knives on each side of row.
**One knife per row in middle

The application of anhydrous ammonia on a sandy loam soil was more effective with one knife per row than two knives per row. It is not as difficult to hold the ammonia in a sandy loam soil as in a soil of high clay content.

Highest yields were obtained on this sandy loam soil with 100 pounds of nitrogen either from ammonium nitrate or urea side dressed in late May.

## SOYBEAN SOIL FERTILITY EXPERIMENTS

Soil fertility experiments with soybeans were conducted at two locations in 1960. A trace element study was included at the Bragg City experiment field with fertilizer (50+50+50) and fine lime. No increases in yield from these trace mineral additions were obtained. Molybdenum added to the soybean inoculant depressed yields at the Sikeston field. The application of 50+50+50 did not increase the yield of soybeans over no-treatment on either field.

Yield of Soybeans

| Treatment | Sikeston Experiment Field |
|---|---|
| Inoculant only | 33 bu. |
| Inoculant+ molybdenum | 30 |
| Inoculant only+50+50+50 | 34 |
| Inoculant only+50+50+50+Traces | 34 |

## SMALL GRAIN SOIL FERTILITY EXPERIMENTS

The application of fertilizer to small grain continued to be a very efficient and profitable operation in southeast Missouri. Starter fertilizer (6-24-24) at 150 pounds per acre, applied at seeding, with additional nitrogen in the spring has consistently produced profitable increases in wheat yields.

A soil fertility experiment with rice was conducted at the Portageville Experiment Station, but because of irregularities in stand on a portion of the area no conclusions could be drawn.

## SOIL FERTILITY EXPERIMENT - WHEAT - 1960

| Soil Treatment Starter | Topdress | Date | (1) Bragg City Exp. Field | (2) Kalkbrenner | (3) Sikeston Exp. Field |
|---|---|---|---|---|---|
| No Treatment | | | 21.1 | 57.8 | 41.2 |
| 36+36+36 | None | | 26.8 | 66.8 | 51.3 |
| 36+36+36 | 33# N | March | 48.0 | 68.2 | 59.9 |
| 36+36+36 | 66# N | March | 53.6 | 67.9 | 60.8 |
| 9+36+36 | None | | 21.8 | 63.2 | 48.8 |
| 9+36+36 | 33# N | March | 41.9 | 66.1 | 57.7 |
| 9+36+36 | 66# N | March | 49.3 | 68.7 | 58.5 |
| 9+36+0 | 66# N | March | 49.8 | 65.2 | 59.1 |
| 9+0+36 | 66# N | March | 49.5 | 68.1 | 60.7 |
| 9+36+36 | 66# N | March (Amo Sulfate) | 44.2 | 71.2 | 58.4 |
| 9+36+36 | 66# N | March (Urea) | 53.3 | 70.0 | 60.6 |
| 9+36+36 | 66# N | March (32% Liquid) | 51.8 | | 48.2 |
| 9+36+36 | 100# N | March | 64.3 | 70.0 | 59.1 |
| 9+36+36 | 132# N | March | 67.4 | 69.8 | 59.9 |
| 9+36+36 | 66# N | January 1 | 36.0 | 66.7 | 55.0 |
| 9+36+36 | 66# N | February 15 | 36.5 | | 54.0 |
| 9+36+36 | 66# N | March 15 | 49.8 | 68.5 | 53.7 |
| 9+36+36 | 66# N | April 15 | 51.1 | 69.3 | 54.7 |
| 9+36+36 | 66# N | May 1 | 41.8 | | 43.8 |
| None | 66# N | March | 49.5 | 63.2 | 55.3 |
| None | 75+36+36 | January 1 (4) | 39.4 | 65.3 | 53.7 |
| None | 75+36+36 | February 15 (4) | 39.0 | 65.7 | 55.0 |
| None | 75+36+36 | April 1 (4) | 49.7 | | 56.5 |
| None | 75+36+36 | January 1 (5) | 39.4 | 63.8 | 55.3 |
| None | 75+36+36 | February 15 (5) | 39.5 | 63.7 | 52.8 |
| None | 75+36+36 | April 1 (5) | 52.6 | | 56.1 |
| None | 75# N | March | 54.2 | 59.3 | 60.1 |
| None | 33# N | March | 45.1 | 55.1 | 51.2 |
| 0+36+36 | 66# N | March | 51.9 | 65.2 | 56.6 |
| 36+36+36+TM | 66# N | March | 59.2 | 67.2 | 61.8 |

(1) "Gumbo" or Sharkey Clay soil located ½ mile south of Bragg City Vermillion wheat planted October 21, 1959.

(2) Waverly Silt Loam soil located 6 miles southeast of Poplar Bluff Knox wheat planted October 20, 1959.

(3) Dexter Sandy Loam located 1 mile south of Sikeston Vermillion wheat planted October 22, 1959.

(4) Phosphate approximately 100% water soluble.

(5) Phosphate approximately 50% water soluble.

All nitrogen topdressed ammonia nitrate except as indicated.