

# Summary of Fertilizer Results—1949

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The territories served by the American Crystal Sugar Company are widely scattered. For this reason the fertilizer requirements are not the same for all places. Fertilizer tests, therefore, have to be planned for the particular area. The tests as conducted in 1949 will be taken up by areas.

## Tests in the California Area

As has been previously pointed out (1)<sup>2</sup>, the general fertilizer practice in this area is to apply liberal applications of nitrogenous fertilizers either at the time of seed bed preparation or as a side dressing shortly after thinning. These practices generally result in increased tonnage and in some cases a decreased sugar content.

Two tests are reported from this area, one conducted in the San Joaquin valley and the other near Clarksburg, California. Table 1 gives the fertilizer, pounds of plant food per acre and the yields obtained in the test conducted in the San Joaquin valley at Visalia. This test was planted as a 10x10 Latin square but since only six complete blocks could be harvested it is analyzed as a randomized block.

Although all treatments except the heavy rate of the 16-20-0 show higher tonnages than the check, only the three rates of ammonium sulfate and the two higher rates of 10-10-5 appear to be profitable.

Table 1. Results of San Joaquin Fertilizer Plot Test—1949

| Fertilizer         | Lbs. Plant Food per Acre, | Tons Beets per Acre | % Sucrose | Lbs. Sugar per Acre |
|--------------------|---------------------------|---------------------|-----------|---------------------|
| 21-0-0             | 45                        | 35.66               | 13.63     | 9,721               |
| 21-0-0             | 60                        | 34.49               | 13.28     | 9,162               |
| 21-0-0             | 30                        | 33.51               | 13.34     | 8,941               |
| 10-10-5            | 45                        | 32.09               | 13.28     | 8,524               |
| 10-10-5            | 60                        | 32.27               | 13.04     | 8,415               |
| 16-20-0            | 45                        | 31.95               | 12.73     | 8,140               |
| 10-10-5            | 30                        | 31.15               | 12.91     | 8,042               |
| 16-20-0            | 30                        | 30.84               | 12.85     | 7,927               |
| Check              | ....                      | 29.84               | 13.18     | 7,865               |
| 16-20-0            | 60                        | 30.27               | 12.54     | 7,591               |
| General Mean       |                           | 32.21               | 13.08     | 8,424               |
| Sign. Diff. (19:1) |                           | 4.84                | 1.03      | 1,505               |

The other test reported in this area was carried out near Clarksburg on a semi-peat soil. All of the fertilizers were applied at the rate of 75 pounds of plant food per acre. The results are given in Table 2.

Only the 16-20-0 and the 0-43-0 fertilizers gave a significant increase in yields over the unfertilized treatment.

## Arkansas Valley, Colorado, Area

The tests in this area were in the form of strip tests in farmers' fields. Five fertilizer combinations were applied on twelve row strips running the entire length of the field with two such strips for each fertilizer treatment

<sup>1</sup> Plant Pathologist, American Crystal Sugar Company, Rocky Ford, Colorado.

<sup>2</sup> Numbers in parentheses refer to literature cited.

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Table 2. Results of Clarksburg Fertilizer Plot Test—1949

| Fertilizer         | Tons Beets<br>per Acre | %<br>Sucrose | Lbs. Sugar<br>per Acre |
|--------------------|------------------------|--------------|------------------------|
| 16-20-0            | 27.95                  | 15.34        | 8,574                  |
| 0-43-0             | 26.74                  | 15.23        | 8,116                  |
| 21-0-0             | 24.72                  | 15.48        | 7,652                  |
| 10-10-5            | 24.41                  | 14.92        | 7,283                  |
| 0-0-0              | 23.68                  | 15.29        | 7,244                  |
| 6-12-6             | 24.83                  | 14.58        | 7,240                  |
| General Mean       | 25.39                  | 15.14        | 7,690                  |
| Sign. Diff. (19:1) | 2.88                   | 1.13         | 1,020                  |

at each location. The data for the four locations were combined and the analysis is presented in Table 3.

 Table 3. Arkansas Valley Fertilizer Strip Tests—1949  
Average of Four Locations

| Fertilizer           | Rate<br>per Acre | Tons Beets<br>per Acre | %<br>Sucrose | Lbs. Sugar<br>per Acre |
|----------------------|------------------|------------------------|--------------|------------------------|
| 0-43-0               | 250              | 15.92                  | 15.22        | 4,823                  |
| 16-20-0              | 300              | 15.99                  | 14.86        | 4,694                  |
| 0-15-0 and<br>20-0-0 | 175-150          | 15.20                  | 15.11        | 4,573                  |
| 4-24-4               | 335              | 14.71                  | 15.58        | 4,545                  |
| 6-30-0               | 300              | 14.78                  | 15.35        | 4,470                  |
| 0-0-0                | ...              | 14.16                  | 15.36        | 4,326                  |
| General Mean         | ...              | 15.12                  | 15.25        | 4,572                  |
| Sign. Diff. (19:1)   | ...              | 1.57                   | .49          | 501                    |

The results obtained fall in line fairly well with fertilizer results obtained over the past five years. It may be noted that the highest phosphate fertilizer resulted in the highest yield and that the highest application of nitrogen fertilizer tended to reduce sucrose percent in the beets.

## Northern Iowa-Southern Minnesota Area

The tests in these two areas were conducted in the same manner as those for the Arkansas valley except that there were no unfertilized treatments. The beneficial response to fertilizers is so general in these areas that the farmers object to having unfertilized strips in their fields.

The results for the strip tests in Northern Iowa are presented in Table 4 and for Southern Minnesota in Table 5.

 Table 4. Northern Iowa Fertilizer Strip Tests—1949  
Average of Five Locations

| Fertilizer         | Rate<br>per Acre | Tons Beets<br>per Acre | %<br>Sucrose | Lbs. Sugar<br>per Acre |
|--------------------|------------------|------------------------|--------------|------------------------|
| 4-24-4             | 187              | 14.48                  | 17.26        | 4,981                  |
| 3-18-9             | 251              | 13.57                  | 17.46        | 4,723                  |
| 0-43-0             | 188              | 13.87                  | 17.04        | 4,706                  |
| 13-28-0            | 191              | 13.53                  | 17.09        | 4,613                  |
| 33-0-0             | 144              | 13.07                  | 16.40        | 4,258                  |
| General Mean       | ...              | 13.70                  | 17.05        | 4,656                  |
| Sign. Diff. (19:1) | ...              | 1.25                   | .50          | 390                    |

Table 5. Southern Minnesota Fertilizer Strip Tests—1949  
Average of Three Locations

| Fertilizer           | Rate<br>per Acre | Tons Beets<br>per Acre | %<br>Sucrose | Lbs. Sugar<br>per Acre |
|----------------------|------------------|------------------------|--------------|------------------------|
| 4-24-4               | 235              | 13.52                  | 15.98        | 4,293                  |
| 20-0-0               | 200              | 12.43                  | 16.25        | 4,029                  |
| 0-43-0 and<br>20-0-0 | 100-100          | 12.31                  | 16.24        | 3,987                  |
| 3-18-9               | 250              | 12.53                  | 15.83        | 3,977                  |
| 0-43-0               | 175              | 12.21                  | 15.95        | 3,879                  |
| General Mean         |                  | 12.60                  | 16.05        | 4,034                  |
| Sign. Diff. (19:1)   |                  | .58                    | .37          | 165                    |

In both areas the outstanding fertilizer was 4-24-4. Similar results have been obtained for the last four years of testing.

### Red River Valley, Minnesota

High phosphate fertilizers have given the best performance in this area. Almost universally the beet crop is preceded by summer fallow which in turn was preceded by a green manure crop. The nitrogen content of the soil seems to be quite adequate since small increments of this nutrient tend to depress sugars somewhat. The results for this area are presented in Table 6.

The results of this year's testing indicate that 0-36-8 and 0-43-0 give the greatest yield increment.

Table 6. Red River Valley Fertilizer Strip Tests—1949  
Average of Six Locations

| Fertilizer         | Rate<br>per Acre | Tons Beets<br>per Acre | %<br>Sucrose | Lbs. Sugar<br>per Acre |
|--------------------|------------------|------------------------|--------------|------------------------|
| 0-36-8             | 150              | 13.17                  | 17.72        | 4,556                  |
| 0-43-0             | 150              | 13.07                  | 17.38        | 4,541                  |
| 2-32-8             | 150              | 12.95                  | 17.31        | 4,461                  |
| 4-24-4             | 200              | 11.58                  | 17.37        | 4,025                  |
| General Mean       |                  | 12.70                  | 17.45        | 4,423                  |
| Sign. Diff. (19:1) |                  | .80                    | .52          | 303                    |

### Summary

The fertilizer test in the San Joaquin valley emphasizes the need for high nitrogen fertilizers while the test on semi-peat soil at Clarksburg, California, showed that phosphate was needed in the fertilizer mixture.

High phosphate fertilizer is required for maximum yields in the Arkansas valley, Colorado.

The complete fertilizer 4-24-4 gave the highest yield increment in Northern Iowa-Southern Minnesota area.

The highest yields were obtained in the Red River valley, Minnesota, with high phosphate fertilizers. Even small increments of nitrogen tend to lower sucrose and yield.

### Literature Cited

1. DOWNIE, A. R. Summary of Fertilizer Results, 1947. Proc. Am. Soc. Sug. Beet Tech. pp 421-426. 1948.