GRAIN sorghum is becoming an increasingly important crop on irrigated lands in many parts of the West. However, irrigated farmers depend largely upon cultural and soil management practices developed for sorghum under dry-land conditions. As a result, grain yields are low. For example, on the Tucumcari Irrigation Project in northeastern New Mexico, yields averaged only 27.2 bushels per acre for the past 6 years. While these were approximately double those from dryland, the difference is not sufficient when the high costs of irrigated agriculture are considered.

That high sorghum grain yields can be produced under irrigation has been shown by Nelson in trials at Moses Lake, Wash. He reported yields of 125 bushels per acre in a spacing-nitrogen trial with three varieties. In these studies, Nelson found that nitrogen fertilizer increased yields by as much as 40 bushels per acre. Plant populations ranging from 72,000 to 228,000 plants per acre, however, had no significant effect on yield, nor did varieties influence yields. He noted no interaction between spacing and varieties, fertility and varieties, or fertility and spacing.

During 1951, an experiment was conducted on the Northeastern Substation at Tucumcari, New Mex., to investigate the fertilizer, moisture, and plant population requirements of grain sorghums in the Southwest. This paper reports the results from this experiment.

METHODS AND MATERIALS

The experiment was conducted on a newly broken Springer fine sandy loam at the Northeastern Substation. The field was plowed from native vegetation in 1950, leveled, and sown to wheat as a winter cover crop. The experiment was laid out in a split-plot design with moisture levels and plant spacings in the main plots on four replications. The fertility treatments were placed as subplots on each of the main treatments. The main plots were four rows wide by 245 feet long, the subplots four rows wide by 35 feet long. Plainsman sorghum was planted May 31.

The main plot treatments were as follows:

- M1—Soil moisture tension at the 9-inch depth maintained below 0.7 atmospheres throughout the growing season.
- M2—The soil moisture tension allowed to reach 12—15 atmospheres at the 9-inch depth before irrigation, except during heading when the tension was maintained below 0.7 atmospheres.
- S1—Plants thinned to 4-inch spacing within 36-inch rows.
- S2—Plants thinned to 9-inch spacing within 36-inch rows.

The subplot treatments randomized within each main plot were as follows:

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
<th>F7</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>120</td>
<td>240</td>
</tr>
</tbody>
</table>

The degree of heading was evaluated on August 8, approximately 2 weeks before complete heading. The plots were harvested on October 25. Yields are reported in 56 pound bushels at 12% moisture.