The Effect of Flax Stand on Yields of Flaxseed, Flax Straw, and Weeds

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The high price and shortage of flaxseed in recent years aroused considerable interest in lower rates of seeding for flax. The recommended rate for southern Minnesota is 56 pounds per acre for varieties such as Koto, Dakota, Minerva, and Crystal. Many farmers have sown 42 pounds per acre, some 28 pounds, and some even less. The use of insufficient seed may result in lowered yields of seed and straw and in greater weed growth. The effect of stand on yield is also of interest because practices such as spraying flax with herbicides and post-emergence harrowing may at times reduce stand because of wheel and treatment damage.

Trials to determine the effect of stand on yields of seed, straw, and weeds were conducted at St. Paul for 3 years, 1945 to 1947. In these trials stand differentials were obtained by hand thinning a uniform planting in order to get actual stand differences and to decrease the size of plot required.

Materials and Methods

The flax was grown on Waukegan silt loam soil. Although gravel is found at 35 to 40 inches, there was no noticeable effect of drouth on the crop, since rainfall was ample and well distributed. Weeds consisted chiefly of Setaria species, Chenopodium album L., Polygonum convolvulus L., and Echinochloa crusgalli (L.) Beauv. The central square yard on each plot was pulled to obtain yields of flax and of weeds. Yields of weed plants are based on oven-dry weights.

In 1945 and 1946, flax was sown with a grain drill at the rate of 56 pounds per acre and thinned when 2 to 3 inches high. The following treatments were replicated six times:

1. 100% stand.  
2. 75% stand, obtained by pulling every fourth flax plant.  
3. 50% stand, obtained by pulling every other flax plant.  
4. 25% stand, obtained by pulling three flax plants and leaving the fourth.  

In 1945, plots were 4 by 5 feet and were located on the 1/40 acre variety plots of Koto and Dakota. The plots were arranged so that a complete replicate of four treatments was located on the end of each variety plot. In 1946, plots were 5 by 5 feet and were located in a field of Koto flax. Two stand counts of 2 feet of row each were taken on every plot to determine the actual stand on July 10, 1946.

In 1947, Koto flax was sown at 70 pounds per acre which made possible the addition of a 125% stand treatment. The following treatments were replicated four times:

1. 125% stand  
2. 100% stand, obtained by pulling one flax plant  
3. 75% stand, obtained by pulling two flax plants  
4. 50% stand, obtained by pulling three flax plants  
5. 25% stand, obtained by pulling four flax plants  
6. 12½% stand, obtained by pulling nine flax plants.

Plots were 5 by 5 feet, and two stand counts of 2 feet each were taken on every plot to determine the stand on July 25.

Results

Since the effects of the various stands in 1945 were similar to their effects in 1946, averages for the 2 years are reported in Table I. In 1946, the percentage stands in the table were based on stand in May. The actual percentage stands in 1946, based on duplicate counts of 2 feet each on every plot, were 100%, 76%, 54%, and 29% which closely with those obtained from the differential hand thinning in May.

Highly significant differences between stands were obtained in yields of flax straw and of weed plants. The linear trends for yields of weed plants in relation to flax stand were significant. Yields of flax straw decreased as stand of weed plants increased as stand of flax decreased. Yields of flaxseed did not differ significantly between stands, but the trend was down with decreasing stand. This latter trend was significantly linear.

The trial was modified in 1947 to include additional stands, one above and one below the 1945-46 range. It was thought that significant differences would be obtained.

<table>
<thead>
<tr>
<th>Percentage stand in May</th>
<th>Flaxseed bu.</th>
<th>Flax straw lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>14.6</td>
<td>2,285</td>
</tr>
<tr>
<td>75</td>
<td>13.5</td>
<td>1,920</td>
</tr>
<tr>
<td>50%</td>
<td>12.0</td>
<td>1,600</td>
</tr>
<tr>
<td>25%</td>
<td>10.5</td>
<td>1,325</td>
</tr>
<tr>
<td>12½%</td>
<td>9.0</td>
<td>1,120</td>
</tr>
</tbody>
</table>

Table I.—Effect of stand of flax on yields of flaxseed in bushels per acre and of flax straw and of weed plants in pounds per acre, 1945-40.