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Inoculate for More and Better Soybeans

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Inoculating Soybeans

<table>
<thead>
<tr>
<th>Test</th>
<th>Not Inoculated</th>
<th>Inoculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increased Yield of Beans</td>
<td>14.7 Bu.</td>
<td>19.3 Bu.</td>
</tr>
<tr>
<td>2. Increased Protein Content of Beans</td>
<td>31.5%</td>
<td>35.1%</td>
</tr>
<tr>
<td>3. Increased Protein Produced Per Acre</td>
<td>278</td>
<td>407</td>
</tr>
<tr>
<td>4. Decreased Oil Content of Beans</td>
<td>21.4%</td>
<td>20.2%</td>
</tr>
<tr>
<td>5. Increased Oil Produced Per Acre</td>
<td>189 Lbs.</td>
<td>235 Lbs.</td>
</tr>
<tr>
<td>6. Increased Nitrogen in Bean Straw Residues Per Acre</td>
<td>17.8 Lbs.</td>
<td>23.0 Lbs.</td>
</tr>
</tbody>
</table>

For many years the experiment station folk, we of the Iowa Station included, have been telling you to inoculate your soybean seed. But just how much increase in yield can you expect from inoculation, and will it improve the quality of the crop produced?

The past year we carried on some experiments at the Soil Conservation Experimental Farm near Clarinda in Page County to try to get the answers to these questions.

Because these tests were being made in southwestern Iowa on sloping land and in a region which has not previously grown many soybeans but has begun to in order to help supply increased war demands, we wanted to know how much planting on the contour would help the crop. At the same time the methods of planting—such as shallow and deep listing, surface planting and drilling—were compared to find the one best suited to this region.

Briefly, this is what we found:

1. Inoculation stepped up the yield from about 15 bushels to around 19½ to the acre—31 percent.
2. Inoculation increased the protein content of the soybeans so that with the increased yield of beans, we obtained nearly a half more protein to the acre—47 percent.
3. Inoculation slightly decreased the percentage of oil in the beans, but because of the increased yield, we got about 25 percent more oil to the acre.
4. Inoculation left more nitrogen in the bean straw to be plowed under and enrich the soil after the beans were combined.
5. It took about $14 worth of commercial nitrogen fertilizer to get as good yield from beans that were not inoculated as from those growing alongside, which had been inoculated at a cost of less than 20 cents.
6. Beans planted on the contour were ahead in all of the different planting methods tried. A more extensive check of the results from contour planting is given in another article in this issue of the Reporter.

We shall discuss here the results of our tests in Page County.

Inoculation Tests

Inoculation of soybeans is essential if nodulation is to be obtained when beans are planted on any field for the first time. The bacteria that produce nodules on soybeans will not do so on any other crop.

The inoculation experiment was planted on an almost level area of Marshall silt loam, typical of much of southwest Iowa. The area had been in corn the 2 previous years. The corn yields had been close to 60 bushels so that the fertility level might be considered reasonably good. The beans were planted in 21-inch rows and comparisons were made between 14 inoculated and un inoculated plots.

By mid-July the uninoculated beans could easily be picked out because of the lighter color of their leaves, which during August turned almost yellow and were shed at maturity well before those on the inoculated plants.

Inoculating Soybeans

Helps Southwest Iowa Acre Yield of Beans, Oil and Protein; Contour Planting Is Helpful

By A. G. NORMAN and G. M. BROWNING

Published by Iowa State University Digital Repository, 1943
Contouring Soybeans

*Experiments on Marshall Silt Loam
Page County—1942
Variety—Mukden

Contouring Helped

The experiments on contouring and planting methods were made nearby on a slope that did not exceed 9 percent. Plantings were made by different methods on plots, some of which ran up and down the slope and some of which ran round the slope on the contour. The row-planted beans were spaced 30 inches apart. When listing was practiced, the yield on the contour was 2.8 bushels greater than on the up-and-down hill plots, similarly planted, an increase of 11 percent.

No difference was found between deep-listing and shallow-listing. Surface planting, however, was preferable to listing in 1942, and surface planted beans outyielded those listed on all plots by about 8 percent. Again there was an advantage for contouring, since surface-planted beans on the contour outyielded the up-and-down hill beans by 9 percent. All these beans were inoculated. In addition, however, we had some plots in which uninoculated beans were drilled solid. Contouring here also was preferable, since those beans drilled on the contour outyielded the up-and-down hill drilled beans by 16 percent.

Our results indicate that in whatever way the beans were planted, contouring was worthwhile, not only as a means of preventing losses of topsoil but also because the yield was increased from 2–3 bushels per acre. There are at least two reasons for this difference. First, there is conservation of water. The rain does not run off so easily as when the rows go up and down the slope, and consequently, more enters the soil to be available to the plant. Second, damage due to washing is much reduced. Heavy rains do not easily form little gullies on contoured beans, as they do on beans up and down the hill.

In the latter we have observed small plants washed out or roots exposed after sharp storms, so that it is not surprising that the yield suffers.

Apply Elsewhere?

Two questions that might well be asked are—How widely are these results applicable to other soils and other areas? Will the yield increase for inoculation always be 31 percent, and for contouring 2–3 bushels per acre?

As far as inoculation is concerned, the benefit to be expected depends largely on the general level of fertility of the land, particularly with respect to its available nitrogen. If the soybeans are well supplied with soil nitrogen, the effect of the additional amount provided by the bacteria will not be so noticeable, and consequently smaller yield differences may be expected as a result of inoculation. On soils low in nitrogen the percent yield increase may well be larger. Although our experiments followed 2 years of corn, we believe that the soil still contained a good supply of available nitrogen.

The results to be expected from contouring probably depend somewhat on the season than on the soil type. In a parallel experiment on Shelby silt loam, also in southwest Iowa, the yield difference in favor of contouring was almost the same as on the Marshall soil.

In a season in which there are no heavy storms and in which the rainfall distribution is such that the crop is well supplied at all times, contouring would probably give no yield increase over up-and-down hill planting. But when the season is such that heavy rains may alternate with periods of dry weather, when soil moisture is low, contouring may be expected to give the best results.

The latter is the more frequent and the more probable type of weather in southwest Iowa.

Iowa farmers who want maximum soybean yields will therefore be most likely to obtain them if they inoculate the seed and plant on the contour if their land is sloping.

Farmers will have the additional satisfaction of knowing that each acre production of these vital constituents, protein and oil, will be at a maximum.

This year experiments of a similar nature to those described above will be made in other areas of Iowa.