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Soybeans as a War Crop

THE SECRETARY OF AGRICULTURE has requested a 54% increase in the soybean acreage in the United States to be harvested for the production of beans in 1942. This is a production goal of 9,000,000 acres as compared with 5,855,000 acres in 1941.

Urgent Demand

The industrial demand for soybeans has grown rapidly in recent years and is now at its peak. They are wanted primarily for their high oil content and secondarily for the high-protein feed concentrate which remains after oil extraction. Good-quality beans contain approximately 17% to 20% oil and 37% protein. The soybean meal averages about 44% protein and is also high in calcium, iron, phosphorus, and vitamins B1 and B2, thus being superior for livestock and poultry.

The oil is used in salad dressing, vegetable shortening, oleomargarine, soaps, paints, varnishes, and many other industrial products. It has been officially estimated by the U. S. Department of Agriculture that the domestic consumption of primary animal and vegetable fats and oils was 11 billion pounds in 1939. The 1940 consumption was 9.7 billion pounds. In the crop year 1940-41, approximately 1.6 billion pounds of fats and oils (including oil contained in oil seeds) were imported. More than half of these imports originated in the Pacific area, including the Philippines, Dutch East Indies, Malaya, China, and Japan. It is now the intention to offset the lost imports from these sources by increased domestic production of oil seeds including principally soybeans, peanuts, flaxseed, and cottonseed. Of these oil-seed crops, the soybean is best suited to this state.

By the expression method of oil extraction, a ton or 33 1/3 bushels of soybeans will yield approximately 250 pounds of oil and 1600 pounds of meal. The remaining 150 pounds is lost as moisture and waste in milling. The beans with their entire oil content are not suitable for fattening animals and may be fed only in limited quantities to breeding herds, dairy cattle, and poultry. Feeding unprocessed beans to hogs results in soft pork, which is discounted on the market.

Farmers' Planting Intentions

Although still a very minor crop in Nebraska, farmers have had some experience in growing soybeans. Of 29,000 acres grown in 1941, 20,000 acres were harvested and
threshed for the beans, producing a total of 220,000 bushels at an average yield of 11 bushels per acre. According to a state-wide survey of farmers' planting intentions made last fall by the U. S. Department of Agriculture in connection with the Farm Defense Program a 106% increase in the acreage of soybeans to be threshed for the beans was indicated for 1942, making 40,000 acres. With some grown for forage in addition, the total is likely to approach at least 50,000 acres. More recent information has caused the State-Federal Division of Agricultural Statistics to estimate a still further increase of 30%, which would result in about 65,000 acres in 1942.

**Prices**

As a further inducement, the Department of Agriculture has announced a minimum price of $1.60 per bushel for No. 2 yellow beans, farm basis, for designated varieties and with location and grade differentials. Under favorable conditions and with proper production practices it is possible to produce this quality of beans in Nebraska. While $1.60 per bushel is attractive, the prices of other grains also are likely to be high, and the question of *comparative* crop prices, yields, and costs is important.

The State-Federal Division of Agricultural Statistics advises that on January 15, 1942, Nebraska farmers received the following average prices per bushel: soybeans, $1.50; wheat, $1.12; corn, $.64; oats, $.41; and barley, $.47. Corresponding pre-war prices a year earlier were: soybeans, $.80; wheat, $.73; corn, $.53; oats, $.32; and barley, $.42. The average price received by Nebraska farmers for the 1940 crop of soybeans was $.92, and the indicated average price for the 1941 crop is $1.40 per bushel.

Cash prices paid in Chicago during the five pre-war years (1935-39) were: soybeans, $1.03; wheat, $.97; corn, $.71; and oats, $.34. In comparison the prices on January 30, 1942, were: soybeans, $1.90; wheat, $1.30; corn, $.84; and oats, $.59. The current war prices in general are distinctly more attractive for soybeans as compared with other crops than those of the pre-war period. An exception is the relatively high January, 1942, price of oats in Chicago, which appears to reflect the poor oats crop harvested in the east in 1941.

**Comparative Crop Yields**

During the last 32 years on the Experiment Station farm at Lincoln, the average acre yields in bushels of various standard crops have been as follows: soybeans, 15; corn, 33; oats, 42; and winter wheat, 29. These are yield ratios of 1 to 2.2 for soybeans and corn and 1 to 2.8 for soybeans and oats. Data summarized by the Nebraska Grain Improvement Association for 346 farmers who grew soybeans in the eastern half of Nebraska in 1941, show the following yields: soybeans, 13.1; corn, 32.5; oats, 37; and barley, 28. These are yield ratios of 1 to 2.5 for soybeans and corn and 1 to 2.8 for soybeans and oats. Such yields did not stimulate the growing of soybeans
when the soybean-oats price ratio was about 3 to 1, but a price ratio of 3.5 or 4 to 1 should prove fairly attractive. Harvested as hay during 14 years on the Agricultural Experiment Station farm, soybeans averaged 1.25 tons; alfalfa, 2.25 tons; and Atlas sorgo, 4.39 tons.

**Relative Cost of Production**

In general, soybeans should be regarded as the most costly to produce of any of the standard grain crops under Nebraska conditions, whereas oats and barley are least costly. The differences lie primarily in the amount of field labor needed. Special care must be given soybeans in weed control which involves timely and thorough seedbed preparation by plowing and supplementary disk ing and harrowing, followed by effective intertil lage of the growing crop. The comparative labor costs for various crops may be observed by the following suggestive schedule of field operations. Soybeans are a full-season crop as is corn.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Date</th>
<th>Operation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans</td>
<td></td>
<td>Corn</td>
<td></td>
</tr>
<tr>
<td>Double disk</td>
<td>April 10</td>
<td>Double disk</td>
<td>April 15</td>
</tr>
<tr>
<td>Plow</td>
<td>May 1</td>
<td>List</td>
<td>May 15</td>
</tr>
<tr>
<td>Harrow</td>
<td>May 1</td>
<td>Cultivate</td>
<td>May 30</td>
</tr>
<tr>
<td>Harrow</td>
<td>May 15</td>
<td>Cultivate</td>
<td>June 15</td>
</tr>
<tr>
<td>Double disk</td>
<td>May 24</td>
<td>Cultivate</td>
<td>July 5</td>
</tr>
<tr>
<td>Plant</td>
<td>May 25</td>
<td>Husk</td>
<td>Oct. 20</td>
</tr>
<tr>
<td>Harrow or rotary hoe</td>
<td>June 5</td>
<td>Harrow or rotary hoe</td>
<td>June 15</td>
</tr>
<tr>
<td>Cultivate</td>
<td>June 30</td>
<td>Cultivate</td>
<td>July 5</td>
</tr>
<tr>
<td>Harvest</td>
<td>Oct. 5</td>
<td>Cultivate</td>
<td></td>
</tr>
<tr>
<td>Oats or Barley</td>
<td></td>
<td>Harvest</td>
<td></td>
</tr>
<tr>
<td>Double disk</td>
<td>March 25</td>
<td>Winter Wheat</td>
<td></td>
</tr>
<tr>
<td>Drill</td>
<td>March 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td>July 5</td>
<td></td>
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</tbody>
</table>

For weed control in soybeans it may be advantageous in some seasons to harrow also before the beans come up, and to include an additional cultivation. On the contrary, in exceptionally dry seasons and in relatively weed-free fields, fewer tillage operations may suffice.

Because of this high labor cost compared with that for oats and barley, which are most likely to be replaced by soybeans, it is apparent that the soybeans need to bring more than three times the price of oats when the yield is only about one-third as many bushels per acre. Oats conflict much less with corn for labor than do soybeans.

**Special Equipment Not Needed**

The growing of soybeans may be accomplished without purchase of any special equipment. The planting should be in rows 35 to 40 inches apart. The seed should be planted May 20 to June 5 by spacing viable seeds about 1 1/2 inches apart in the row. This may be accomplished with either a corn planter fitted with bean plates or with a grain drill having some of the spouts closed. Such planting requires 35 to 45 pounds of seed per acre, depending
upon the size of seed and spacing of the rows. Early cultivation is best done with a spike-tooth harrow or rotary hoe until the plants are about 6 inches high. Two or three cultivations thereafter with an ordinary corn cultivator will suffice. Planting and cultivation may also be done with equipment designed for growing sugar beets or beans.

Solid drilling is more subject to serious damage from weeds and has averaged 6 bushels less per acre than cultivated rows on the Agricultural Experiment Station farm at Lincoln during 14 years. The beans may be harvested with a combine when fully field cured; or they may be cut with a grain binder, cured in the shock, and threshed with a grain separator. For safe storage the beans should not contain more than 14% moisture. Production practices should be directed toward growing high-quality beans as the price of inferior grades is heavily discounted.

**Adaptation**

Soybeans are recognized as adapted to eastern Nebraska and under irrigation elsewhere. Their yield responds to favorable soil fertility and soil moisture. Irrigation gives good results, but other standard crops are likely to be benefited even more. In general their production is recommended for that portion of eastern Nebraska bounded on the west by Thayer, York, Polk, and Madison counties. Growers so located have the advantage of proximity to processing mills. More westward production should depend upon further experience that farmers may have with the crop. Soil suitable for corn is generally suitable for soybeans.

Complete resistance to chinch bugs adds materially to the attractiveness of soybeans in eastern Nebraska, where a serious epidemic of this insect is threatening cereal crops.

*The character of the soybean plant is such that this crop leaves the soil exceptionally loose and subject to erosion. For this reason soybeans should be grown only on rather level land, and not on rolling or hilly land.*

**Crop Diversification**

The greatest continuity of farm income normally results from diversification of crops. It seems probable that the maximum wheat and corn acreages permitted by the AAA will be grown. On the other hand, especially in view of the threatening chinch bug epidemic, it would seem attractive to substitute soybeans for part of the oats and barley in eastern Nebraska in 1942 or to plant them on other crop land. In the AAA Farm Program (authority 1942 NCR 601), soybeans will not qualify as “conserving” if harvested either as hay, pasture, or threshed beans.

**Varieties**

The varieties now recommended most highly for Nebraska are the Dunfield and Illini. Both are erect, highly shatter resistant, and ripen early enough for combining
in October. They produce choice yellow seed of high oil content and meet the varietal requirements for the 1942 guaranteed federal price. They have given the highest yields among the varieties tested and available commercially. The Mukden and Manchu are also suitable and productive varieties now being grown. The Manchu is the latest of this group and should be restricted to southeastern counties.

Planted about June 5, the average dates of ripening of these four varieties are: Dunfield, Sept. 20; Mukden, Sept. 26; Illini, Sept. 30; and Manchu, Oct. 1. While superior in yield of threshed beans, these four yellow varieties have also proved as productive of forage as the standard dark-seeded forage varieties such as the Kingwa and Virginia. Since the dark beans are heavily discounted in price, their production is not advocated. The yellow beans may be regarded as a dual purpose crop suitable for either grain or forage.

Seed Sources and Supplies

Being a self-fertilized crop, the source of seed is not of particular importance, provided the desired variety is obtained. Because of unfavorable climatic conditions last fall for curing and harvest in some parts of the country, seed from such sources may have had its viability impaired. As a matter of efficient planning, a suitable seed supply should be procured at an early date. Seed prices are likely to advance with the approach of the planting season. Information regarding seed sources may be obtained from county agricultural agents.

(Prepared by T. A. Kieselbach, Agronomist, Nebraska Agricultural Experiment Station.)