

South Dakota State University

# Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

---

SDSU Extension Fact Sheets

SDSU Extension

---

1979

## Fertilizing Soybeans

Cooperative Extension South Dakota State University

Follow this and additional works at: [https://openprairie.sdstate.edu/extension\\_fact](https://openprairie.sdstate.edu/extension_fact)

---

### Recommended Citation

South Dakota State University, Cooperative Extension, "Fertilizing Soybeans" (1979). *SDSU Extension Fact Sheets*. 796.

[https://openprairie.sdstate.edu/extension\\_fact/796](https://openprairie.sdstate.edu/extension_fact/796)

This Fact Sheet is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Fact Sheets by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact [michael.biondo@sdstate.edu](mailto:michael.biondo@sdstate.edu).

# Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



For current policies and practices, contact SDSU Extension

Website: [extension.sdstate.edu](http://extension.sdstate.edu)

Phone: 605-688-4792

Email: [sdsu.extension@sdstate.edu](mailto:sdsu.extension@sdstate.edu)

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

# fertilizing soybeans



**COOPERATIVE EXTENSION SERVICE  
SOUTH DAKOTA STATE UNIVERSITY  
U.S. DEPARTMENT OF AGRICULTURE**

630.732  
5087.29  
FS 748

# fertilizing soybeans

Robert P. Schoper, Extension agronomist-soils  
Paul Carson, professor, plant science  
Ron Gelderman, manager, soil testing lab

Soybean acreage in South Dakota has more than tripled since 1960. During this same period of time the average soybean yield per acre has risen by 50%.

Even though only 6% of the soybeans in South Dakota are fertilized directly, greater use of fertilizers has contributed to these increased yields. Experience indicates that soybeans do respond to fertilization if soil levels of phosphorus and potassium are not high (Table 1). Normally, soybeans benefit indirectly from fertilizer use in corn-soybean rotations.

**Table 1. Influence of starter fertilizer on soybean yields at Southeast Experiment Farm, 1965-76\*.**

Year	Yield, bu/A	
	No fertilizer	Fertilized (6 + 25 + 12)
1965	17	23
1966	18	21
1967	—	—
1968	33	35
1969	31	34
1970	27	29
1971	22	25
1972	38	42
1973	21	27
1974	24	24
1975	28	31
Average	25.9	29.1

\* data by Fred Shubeck  
Soil tests for available phosphorus were medium and for exchangeable potassium were high.

## Nitrogen

High soybean yields demand large quantities of nitrogen. Fortunately, soybeans meet their own nitrogen needs through symbiotic fixation of atmospheric nitrogen. Adding large amounts of fertilizer nitrogen reduces nodule development and produces no consistent increase in yield (Table 2). Small amounts of nitrogen fertilizer included in a starter treatment (up to 10 lb) occasionally give improved early growth.

**Table 2. Nitrogen fertilization of soybeans at the Southeast Experiment Farm.\***

Added nitrogen lbs/A	1970	1971
	0 + 30 + 30	0 + 30 + 0
0	21	21
30	21	21
120	21	21

\* Data by Fred Shubeck

## Phosphorus and Potassium

Soybeans respond to direct applications of phosphorus and potassium fertilizers when soils test in the low to medium range.

Recommended rates of phosphorus and potassium fertilizer (Tables 3 and 4) may be broadcast and incorporated prior to planting or applied in a band 2 inches to the side and slightly below the seed at planting.

If a starter fertilizer is used, 10 lb/A of nitrogen should be included, but the total amount of nitrogen plus potassium (K<sub>2</sub>O) should not exceed 20 lb/A. No fertilizer should be directly in contact with the seed.

**Table 3. Phosphorus recommendations.**

Yield goal bu/A	Phosphorus soil tests, lbs/A		
	Low Less than 15	Medium 16-25	High 26-35
	P <sub>2</sub> O <sub>5</sub> recommended, lbs/A		
20	30	10	0
30	40	15	0
40	50	20	10
50	60	25	15
60	70	30	20

**Table 4. Potassium recommendations.**

Yield goal bu/A	Potassium soil test, lbs/A		
	Low 51-120	Medium 121-210	High 211-300
	K <sub>2</sub> O recommended, lbs/A		
20	35	20	0
30	50	30	0
40	70	40	20
50	90	50	30
60	110	60	40

## Micronutrient Needs

Iron is the only micronutrient of major importance for soybean production in South Dakota. Iron deficiency frequently occurs on soils with a high soil pH, a high salt concentration, and poor drainage.

Treatment of soybeans with chelated iron compounds may be successful on soils which are not high in soluble salts. Chelated iron should be foliar applied in a band directly over the row when the beans are putting out the second trifoliolate leaves.

Precise timing of the material is essential.

If soil tests indicate that the salt level is marginal, iron chelate should be applied on a trial basis only.

Zinc deficiencies, which appear as a general stunting of plants with the lower leaves becoming yellow while the upper leaves remain green, are not common. Deficiencies, when they occur, are found on sandy, low organic matter soils having a high soil pH, or in areas where the topsoil has been removed (see FS 674 for further information).

## Inoculation

Inoculation is essential in areas where soybeans have not been previously grown; and it may provide good insurance if soybeans have not been grown within the last 3 years. An inoculum insures the presence of live bacteria for nodulation and fixation of atmospheric nitrogen.

Inoculation with a peat based inoculum should be done just before planting. If the inoculated seed is allowed to dry excessively, bacteria numbers will be greatly reduced.

Pre-inoculated soybean seed may be of questionable value. Such seeds are inoculated when they are bagged, and if they are warehoused for several months at variable temperatures, it is possible that not

enough bacteria will survive. Use pre-inoculated seed with caution. (See FS 601 for further information).

Land that has been in soybean production every 2 or 3 years should contain an adequate population of the proper bacteria. A way to check your soybeans for nitrogen fixing bacteria is to dig some plants during the summer and check for nodule development.

### Liming

Liming trials throughout the upper Midwest indicate that a soil pH of 6.0 will result in maximum yields. However, liming studies demonstrate no response to lime at a

soil pH of less than 6.0 when soil layers with a neutral pH exist in the upper 24 inches of the soil profile.

Since most South Dakota soils in the soybean producing area contain a neutral or higher pH zone in the upper portion of the soil profile, the use of lime should be on a trial basis only.

### Summary

Fertilization is only part of a total program. The response of soybeans to fertilizer is more likely when other management factors are controlled, such as varieties, row spacing, and weed control. An effective fertilization program should include:

\* **Soil test** and apply phosphorus and potassium fertilizers when test levels are in the low or medium range.

\* **Inoculate** soybeans where they have not been grown recently.

\* **Omit nitrogen** unless as a starter (10 lbs per acre) with phosphorus and/or potassium.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the USDA, Hollis D. Hall, Director of Cooperative Extension Service, SDSU, Brookings. Educational programs and materials offered without regard to age, race, color, religion, sex, handicap or national origin. An Equal Opportunity Employer.

File: 1.4-8-3,000 printed at estimated 6 cents each—10-79-4192A.

Cover photo: Soybean root showing good nodulation.

Cooperative Extension Service  
U.S. Department of Agriculture  
South Dakota State University  
Brookings, South Dakota 57007

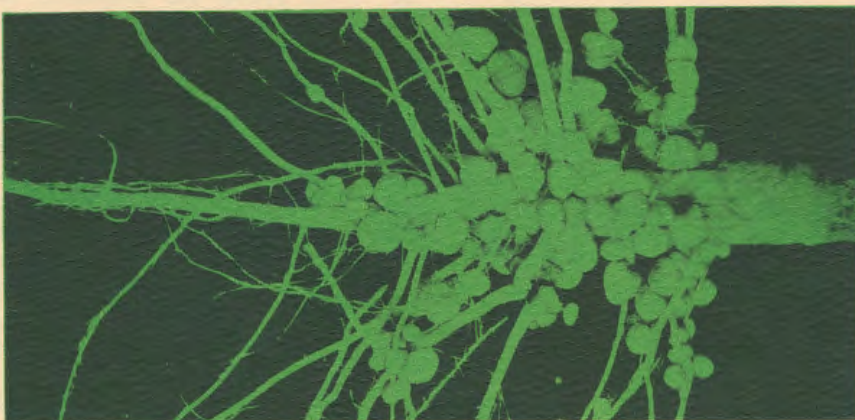
OFFICIAL BUSINESS  
Penalty for Private Use \$300

SDSU LIBRARY  
JUN 24 1980  
STATE DOCUMENT

Postage and Fees Paid  
U.S. Department of Agriculture  
AGR 101



# fertilizing soybeans



COOPERATIVE EXTENSION SERVICE  
SOUTH DAKOTA STATE UNIVERSITY  
U.S. DEPARTMENT OF AGRICULTURE

630.732  
5087.29  
FS 748