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EC67-767 Soybean Irrigation in Nebraska

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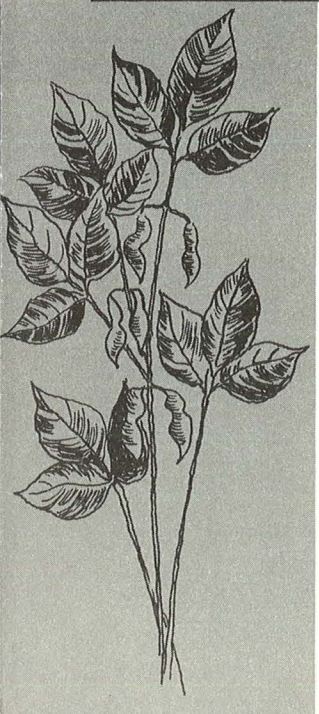

soybean irrigation IN NEBRASKA

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soybean irrigation IN NEBRASKA

H. R. Mulliner, H. H. Hecht, Paul E. Fischbach[1/]

General Irrigation Requirements

Irrigating soybeans may increase yields 45 percent or more in most years, depending on the rainfall and whether off-season irrigation is practiced. On deep soils where off-season irrigation is practiced (filling the root zone before planting) about 25 to 35 bushels per acre can be expected.

Irrigation research at Holdrege and York indicates that high yields (52 bushels per acre) are obtained by maintaining soil moisture at 50 percent or more of its water holding capacity at the 12 inch depth.

Research at the North Platte Station shows that up to 41 bushels per acre can be produced on deep medium textured soil with an irrigation at the late bloom stage, provided the soil is at field capacity to a depth of six feet at planting time and average precipitation occurs during the growing season.

Sandy soils with limited soil depth and water holding capacity may need to be irrigated every 5 to 7 days during July and August in order to produce high yields.

Soybeans produce highest yields on land that has good internal and surface drainage. Irrigated fields should have a minimum slope of 0.2 foot per 100 feet to provide good surface drainage. Excess water from irrigation or rainfall reduces soybean yields, consequently, applying the right amount of water per irrigation is important for high yields.

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P. E. Fischbach is Agricultural Extension Irrigationist.

When To Irrigate

Two methods may be used to determine when to irrigate: (1) Observing soil moisture in the root zone; or (2) Irrigating at predetermined stages of plant growth.

Soil Moisture

Soil moisture in the root zone may be determined by using a soil auger and feeling the soil; or by installing soil moisture sensing devices in the root zone.

Keeping the soil moisture at 50% or more of its holding capacity at the one foot level will give maximum yields. (See E.C. 55-700 for determining soil moisture by the hand feel method.)

Soil moisture sensing devices such as tensiometers or electrical resistance blocks make the task of determining soil moisture much quicker and easier than the hand feel method.

Water should be applied when the 12 inch tensiometer indicates a tension of 0.5 to 0.7 centibars. (See E.C. 61-716 for installation and use of tensiometers).

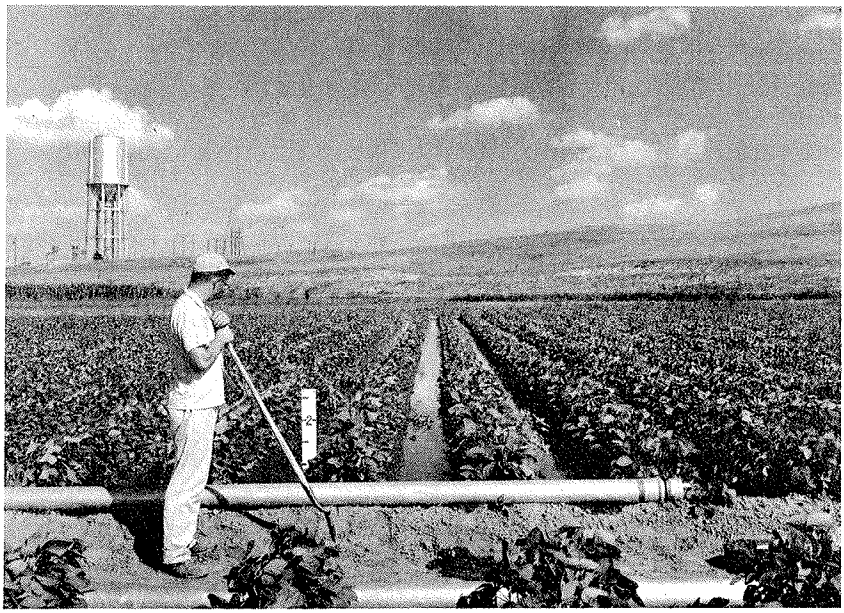
When using electrical resistance meters, irrigations should be made by observing the moisture level from the 12 inch block. Water should be applied when a soil moisture reading of 80 to 120 is reached on the Delmhorst meter or 40% to 60% on the Bouyoucos meter. (See E.C. 65-752 for irrigating with resistance meters.)

Stages of Growth

This method of determining when to irrigate can be used on deep, medium to fine textured soils. It requires that the soil profile be filled to a depth of six feet before planting and that average precipitation occurs during the growing season. Then one irrigation at the late bloom stage will give maximum yields. 2/

How Much Water

At North Platte, Nebraska 22 inches total water was used by soybeans which yielded 41 bushels per acre.2/ This yearly water requirement came from moisture stored in the soil profile, effective rainfall that came during the growing season, and irrigation water.



Consideration should be given to the amount of water applied each irrigation. Knowing the texture of a soil to be irrigated is of prime importance for proper irrigation.

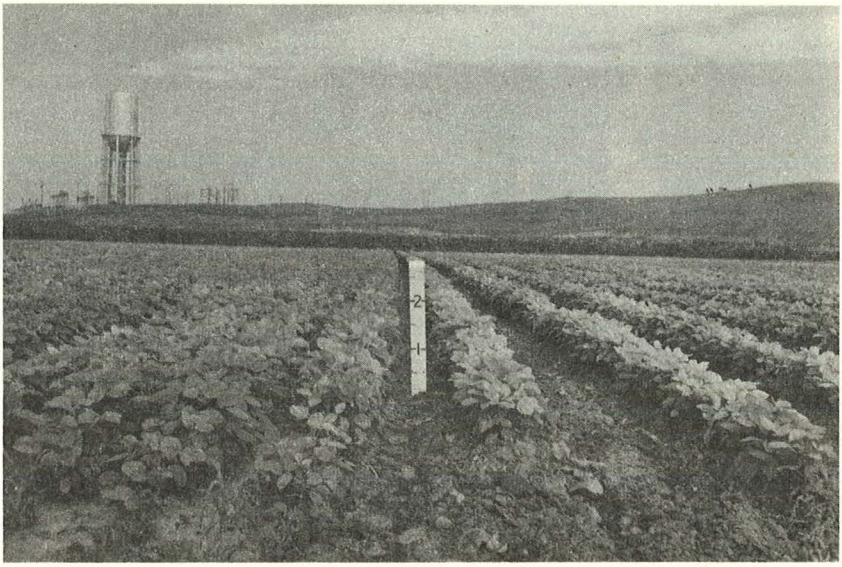
Soil texture refers to the size of soil particles. The larger the soil particles (sands), the less water it is capable of retaining for plant use. The smaller the soil particles (clays), the higher the water holding capacity.

2/ Sommerhalder & Schleusener, North Platte Experiment Station, 1958-1959, "Irrigation can Increase Soybean Production."

Three inches of water is the maximum to be applied to soybeans at one irrigation on deep fine textured soils (clay) and 2 inches of coarse textured sandy soils . The above amounts may need to be increased from 20 to 30 percent to allow for losses due to evaporation and runoff.

Water Management and Iron Deficiencies

Soybeans grow best on land that has good internal drainage. Good drainage is necessary regardless of the method of water application. Soybeans are especially sensitive to iron availability. Iron Chlorosis is closely tied to soil moisture and soil compaction. Good water management is necessary to prevent this condition.



Water Use and Root Zones

Most of the water extracted by soybeans is from the top two or three feet although a few roots may extend down to a depth of five feet. If the soil is moist to a depth of 6 feet at planting time, irrigation water should not penetrate deeper than 2 or 3 feet during the growing season.

The soybean root system is not nearly as extensive as corn or grain sorghum and is rather limited up to the time of blooming. Because of this limited early root growth, soybeans may need to be irrigated early to supply the plant with its water needs until the roots penetrate down to moist soil.

In the research plots at York, Nebraska (planted on June 2) and at Holdrege, Nebraska (planted on May 16) the most rapid water withdrawal occurred during the last week in July and the first week in August.