Extension Folder 102 October 1941

FERTILIZERS *for* MINNESOTA CORN

GEORGE H. NESOM

Phosphate 23 bushels	Phosphate and Potash 56 bushels	Potash 58 bushels	No Fertilizer 28 bushels

Effect of Fertilizers on Yields (Per Acre) of Corn Grown on an "Alkali Spot"

UNIVERSITY OF MINNESOTA
Agricultural Extension Service
U. S. DEPARTMENT OF AGRICULTURE

VARIATIONS in soil, differences in previous cropping and manuring, and the uncertainty of the seasons make it impossible to foretell what response there will be from an application of any fertilizer. Even on soils where a deficiency of some plant food substance is known to exist, an application of that substance in some seasons may fail to increase yields.

It is recommended that farmers try the suggested fertilizers on a small scale, a sack or two of each, on different fields, and from these trials decide whether the fertilizers are likely to be profitable. Unless the trials in the first season produce a definite increase in yield they should be continued for two or more seasons since the results of one year are often not conclusive.

EFFECT OF FERTILIZERS

A liberal supply of available **nitrogen** promotes growth of stalks and leaves, gives the plants a dark green color, and tends to increase the protein content of the crop. **Phosphate** tends to increase root growth, hasten maturity, and increase the proportion of phosphate in the stalks but usually not in the grain. On land where the available phosphate is deficient a phosphate fertilizer may be expected to both increase the yield and hasten ripening. On soils deficient in available **potash** a potash fertilizer will increase the yield.

Apply Fertilizers for Corn

With Attachment on Planter

For best results on corn a fertilizer attachment on the planter should be used. This attachment should place the fertilizer in two bands, one on each side of the hill or row and about 1½ to 2 inches from the seed and at the same or slightly greater depth than the seed.

Where superphosphate is recommended use either the concentrated material, 43 per cent to 48 per cent, or the 20 per cent form at an equivalent rate, 50 pounds of 45 per cent superphosphate being equivalent to 112 pounds of the 20 per cent material. The rates of application given in the following sections are for superphosphate applied with the fertilizer attachment described above. When the fertilizer is spread broadcast the rate should be from one and one half to twice as heavy.

Applications of Fertilizer

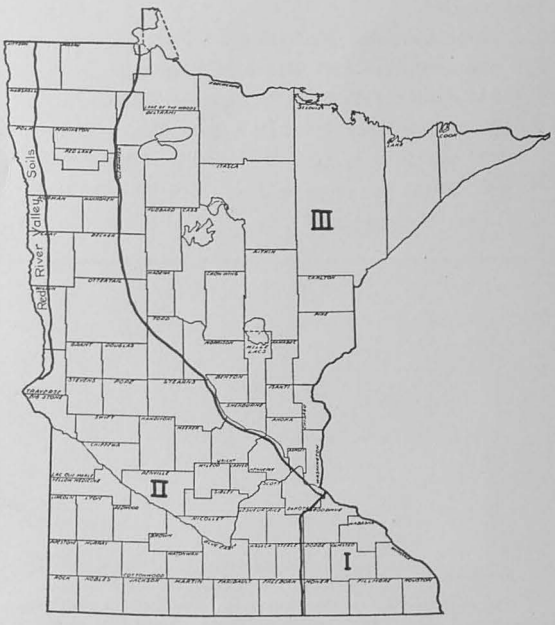
Vary with Sections of State

For convenience in making recommendations the state is divided into three sections (map) according to the general character of the mineral or ordinary soils. These districts differ in general, but no sharp lines can be drawn between adjacent districts as to the fertilizer or fertilizer combination that will cause the greatest benefit on any particular field. Fertilizers for peat soils are dealt with separately at the end of this folder.

Section I—Southeastern Minnesota

This section includes Houston, Fillmore, Mower, Dodge, Olmsted, Winona, Wabasha, and Goodhue counties, in which the soils are in general heavy. In much of it soil erosion has been severe.

1. **On fields naturally well drained but showing little or no erosion, which have been in regular rotations including clover or alfalfa, and have received manure regularly,** fertilizers may frequently show little effect. On these try a phosphate fer-



Sections of Minnesota Referred to in Fertilizer Recommendations

tilizer, either 50 pounds per acre of 45 per cent superphosphate or 112 pounds of 20 per cent superphosphate. This also applies to the level land or flood plains subject to occasional flooding.

2. **Where little or no manure has been applied and where clover or alfalfa has not been grown recently,** it is advisable to try also a **complete fertilizer,** that is one furnishing nitrogen and potash along with phosphate, such as 4-24-12, at 80 to 100 pounds per acre, using a fertilizer attachment. The nitrogen may be expected to show its greatest effect on the slopes or knolls where there has been considerable erosion and where the crop usually has a light yellowish green color.

3. **On level fields with naturally poor drainage** try an 0-20-20 fertilizer at 100 pounds per acre, applied with attachment on the planter.

Section II—Western and South Central Minnesota

In this section dark colored heavy soils, rich in nitrogen predominate, although there are some rather large sandy areas. Available phosphate is deficient on a large proportion of the fields. The phosphate deficiency is more pronounced in the western and southern portions of this section than toward the boundaries of section I and the southern parts of section III. On the sandy areas in the east central portion of this section and elsewhere nitrogen is frequently deficient and on these the recommendations for section III apply. **On the well drained soils** try 45 per cent superphosphate at 50 pounds per acre or 112 pounds of 20 per cent superphosphate, using a fertilizer attachment on the planter.

On the poorly drained areas, commonly called "alkali spots," where corn does poorly, a mixture of phosphate and potash usually gives better results than phosphate alone. On these try an 0-20-20 or an 0-12-24 fertilizer at 100 to 125 pounds per acre put on with the attachment on the planter. On these spots the application may be delayed until the first cultivation or until the poor growth of corn shows just where they are, and then the fertilizer should be applied with an attachment on the cultivator.

Where legumes have not been grown or manure applied recently, it would be well to try, in addition to the superphosphate, a complete fertilizer, such as 4-24-12 at 80 to 100 pounds per acre, or a

similar fertilizer at an equivalent rate, except on the dark colored heavy soils of the Red River Valley, which includes most of Traverse, Wilkin, Clay, Norman, Polk, Red Lake, and Roseau counties and all of Marshall, Pennington, and Kittson counties. These level valley soils while generally deficient in available phosphate are exceptionally rich in nitrogen.

Hybrid Seed Production.—As one of the effects of phosphate is to hasten the development and maturity of plants, and corn treated with superphosphate may tassel three or four days earlier than the unfertilized, some growers make a practice of applying superphosphate, or a mixed fertilizer high in phosphate, to every other row of the male parent so that the period of pollination may be lengthened. Trials may be made with 45 per cent superphosphate at 60 to 65 pounds per acre or 4-24-12 at 100 to 125 pounds per acre. On land that has just been in alfalfa or sweet clover nitrogen is not likely to be of sufficient benefit to warrant its inclusion in the fertilizer, and an 0-20-20 or some other combination of phosphate and potash may be tried.

Section III—North Central and Northeastern Minnesota

This extends from Washington County to Lake of the Woods and Cook counties, with large areas of both sandy and heavy soils originally wooded, and very extensive areas of peat. On the mineral soils in this section nitrogen is the plant food most commonly deficient, with potash next. For both the sandy and heavier soils a complete fertilizer is suggested for trial, such as 4-10-6 or 3-14-14 at 100 to 125 pounds per acre.

Peat Soils Need Fertilizer

To Produce Satisfactory Yields

These behave very differently from the ordinary soils—the loams, sands, and clays, which are called **mineral soils** to distinguish them from peat and muck soils. The latter nearly always require an application of commercial fertilizers or of manure to enable them to produce a satisfactory yield of any crop, and they are especially subject to summer frosts and to injury by fires and flooding. Practically all the peat in the southern part of the

state must be given an application of both phosphate and potash before it will produce a satisfactory crop of any kind. Apply 0-12-24 at 125 to 150 pounds per acre with attachment on planter or 250 pounds per acre spread broadcast.

On peat, corn is always in danger of injury from summer frosts. However, in the part of the state south of the Twin Cities heavy yields of silage can generally be secured providing the drainage is satisfactory and the necessary fertilizer is applied. In some seasons good yields of grain can be secured, but the corn is rarely as dry and hard as that grown on adjacent mineral soil.

AT YOUR SERVICE

This folder is one of the many publications issued by the Agricultural Extension Division, University of Minnesota, University Farm, St. Paul. The Agricultural Extension Division serves Minnesota farmers through COUNTY AGRICULTURAL, HOME DEMONSTRATION, and 4-H CLUB AGENTS.

Other extension folders in related fields include:

22—Improved Varieties of Farm Crops
62—Legume and Grass Mixtures
84—Getting Alfalfa Stands on Sandy Soils
101—Fertilizers for Minnesota Small Grains

These folders may be obtained free from your local county agent or from The Bulletin Office, University Farm, St. Paul.

UNIVERSITY FARM, ST. PAUL, MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Division and United States Department of Agriculture Cooperating, Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914. 20M-10-41