

# FERTILIZERS

for

# MINNESOTA SMALL GRAINS

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No Fertilizer

Superphosphate

EFFECT OF PHOSPHATE ON WHEAT  
Bundles Taken from Equal Areas

**V**ARIATIONS 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.

### **TRY FERTILIZERS ON SMALL SCALE**

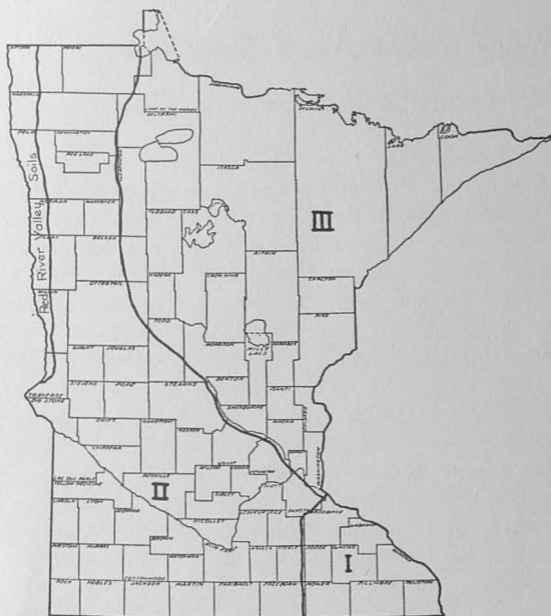
It is recommended that farmers try the suggested fertilizers on a small scale, a sack or two of each, on different fields and from these trials decide whether the fertilizers are likely to be profitable. Unless the trials the first season produce a definite increase in yield, they should be continued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

## *Nitrogen, Phosphate, and Potash* **Have Different Effects on Grain**

**Nitrogen.**—A liberal supply of available nitrogen promotes growth of stems and leaves, gives the plant a dark green color, and tends to increase the protein content of the crop. A heavy growth of straw indicates a liberal supply of available nitrogen and the presence of sufficient moisture. Thus where grain grows heavy and lodges, nitrogen should not be applied.

**Phosphate.**—Phosphate tends to increase root growth, hasten maturity, and increase the proportion of phosphate in the straw 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 the ripening of the crop.

**Potash.**—On soils deficient in available potash a potash fertilizer will increase the yield and plumpness of the grain and may lessen the tendency to lodging. However, in most cases in Minnesota the lodging of the small grains is not due to a lack of available potash but to a very liberal supply of available nitrogen.



SECTIONS OF MINNESOTA REFERRED TO IN FERTILIZER  
RECOMMENDATIONS

## *Apply Fertilizers to Grain* **With Grain Drill Attachment**

Phosphate fertilizers and mixed fertilizers containing phosphate give better results when applied with a combination fertilizer and grain drill or an attachment on the common grain drill than when spread broadcast. With the combination drill or the attachment to the ordinary drill the fertilizer may be delivered in the drill row with the grain, either through the same spouts or, with some attachments, through separate spouts. Ordinary applications of fertilizer in contact with the seed have not injured wheat, barley, or oats.

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, 100 pounds of 45 per cent superphosphate being equivalent to 225 pounds of the 20 per cent material. The rates of application given in the following sections are for superphosphate applied with the combination drill or with fertilizer attachment on the ordinary drill. When broadcast the rate should be 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 fertilizer, either 50 pounds per acre of 45 per cent superphosphate or 112 pounds of 20 per cent superphosphate.

**2. On fields with moderate to severe erosion where manure has been applied regularly,** try phosphate as under "1." Where little or no manure has been applied and where clover or alfalfa have not been grown frequently, it is advisable to try also a nitrogen fertilizer, such as sulfate of ammonia, using this both alone and along with the phosphate. The nitrogen fertilizer 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 yellowish green color. It may be spread broadcast at 100 to 200 pounds per acre just before or right after seeding, after the grain is 2 or 3 inches high, or even as late as when the yellow color or poor growth has become apparent.

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

**4. On winter wheat and rye** spring applications of nitrogen fertilizers are more effective than fall

applications. On these try sulfate of ammonia at 100 to 200 pounds per acre, spread broadcast as a topdressing as early in the spring as growth begins or before.

## **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 towards the boundaries of section I and the southern part 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 applied with the attachment on the drill or 112 pounds of 20 per cent superphosphate.

**On the occasional flat, naturally poorly-drained areas, commonly called "alkali spots,"** try also an 0-20-20 fertilizer at 100 pounds per acre.

Wheat is usually the best grain for trial in the northern part of this section, while barley is preferable in the southern part. Flax shows a benefit from an application of phosphate much less frequently than do wheat, barley, and oats.

## **Section III—North Central and Northeastern Minnesota**

This consists of the northeastern and north central portions of the state, originally wooded, with large areas of sandy and peat soils. On the mineral soils of this section nitrogen is the plant food most commonly deficient for small grains.

**On the sandy soils** try sulfate of ammonia at 100 to 200 pounds per acre spread broadcast at the time of seeding or soon after.

**On the heavy soils** try ammonium sulfate, the same as recommended for sandy soils, but in addition try a complete fertilizer, such as 4-10-6 at 150 pounds per acre, using a drill with a fertilizer attachment.

**On winter grains, wheat or rye,** the sulfate of ammonia should be applied at 100 to 200 pounds per acre as a topdressing as early in the spring as growth begins or even before.

# *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 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. On the whole they are poorly adapted to the small grains with the single exception of winter rye, which usually does well on peat soils in all parts of the state when the proper fertilizer is used.

In northeastern Minnesota some of the peat bogs require liming but very few of these are under cultivation. In the other sections of the state the peat is naturally well supplied with lime. Where a farmer has mineral soil as well as peat, the stable manure may better be applied on the mineral soil while commercial fertilizer will be much more satisfactory on the peat.

In northwestern Minnesota north of Ottertail County try 45 per cent superphosphate at 50 pounds per acre with attachment on drill or at 100 pounds per acre spread broadcast.

In other parts of the state both phosphate and potash are generally necessary and 0-12-24 at 150 pounds to the acre with attachment on drill or 200 pounds per acre spread broadcast is recommended.

### **RESIDUAL EFFECTS OF FERTILIZER**

Where the peat has been heavily fertilized for potatoes, no fertilizers need be applied for the first grain crop following. On mineral or ordinary soils the greatest profit from the fertilizer will often be obtained when alfalfa or clover is seeded with the grain as the latter will not use all the phosphate or potash, and the residues of these plant nutrients may show a marked benefit on the following hay crop.

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