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# BUYING FERTILIZERS

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## WHAT ARE FERTILIZERS?

Fertilizers are chemical compounds used to supply the soil with those plant foods which are found to be limiting maximum plant production. There are many plant food elements required for the growth of plants, but only nitrogen, phosphorus, and potassium are usually limited in Michigan's mineral soils. These elements, singly or in mixtures of two or all three, are found in commercial fertilizers. The other elements, except in unusual cases are supplied in sufficient quantities by the soil. In the case of sour or acid soils, some form of lime should be applied. A suitable fertilizer to supply the needed plant foods will also be required.

The actual important ingredients in fertilizers are nitrogen, phosphoric acid, and potash; and the percentages of these in a fertilizer are expressed in numbers. A 2-12-6 mixture is called a two-twelve-six fertilizer. The numbers mean 2 per cent nitrogen, 12 per cent phosphoric acid, and 6 per cent potash, and these plant foods in suitable condition for application are what you are paying for in a fertilizer. Fertilizer should always be bought by analysis and never by trade name.

Fertilizers are usually made up of both organic and inorganic materials. Organic materials most commonly used are tankage, fish scrap, tobacco stems, dried blood, garbage tankage, cottonseed meal, and bone meal. The inorganic materials commonly used are sulphate of ammonia, liquid ammonia, calcium cyanamid, nitrate of soda, superphosphate, and muriate of potash. The inorganic materials make up by far the largest per cent of the commercial fertilizers.

## What Plant Foods Do to the Plant

**Nitrogen**—Nitrogen promotes the vegetative or green growth of plants. In the soil, it is found primarily in the organic matter and is made available only through bacterial action. Bacteria function best in warm, moist conditions; consequently, in cold wet weather and in soils low in organic matter this element is present in limited amounts. Nitrogen may be added to the soil by plowing down legumes or by applying barnyard manure or commercial fertilizer.

**Phosphorus (Phosphoric acid)**—This plant food element usually is obtained from superphosphate or mixed fertilizers containing superphosphate. Practically, all Michigan soils are deficient in phosphorus. Phosphorus increases root development, hastens maturity, and usually

increases the size of plants. It is used by the plant largely for the formation of the fruit or seed. Selling of grain removes large quantities from the farm while feeding the grain on the farm removes very little.

**Potassium (Potash)**—This plant food element is obtained largely from muriate of potash. The total supply of this material is large in most mineral soils, but it becomes available very slowly, especially in sandy soils. Potash is used by plants to stiffen the straw and to aid in the formation of starch, sugar, and similar compounds. When used in sufficient quantities, it delays maturity to a slight extent. Potash is found primarily in the roots and stems of plants. Alfalfa, clover, and root and tuber crops, as potatoes and sugar beets, require large amounts of potash. In muck soils, potash is present only in very small quantities.

### What to Consider in Buying Fertilizers

**1. Kind of Soil**—On the very heavy types of soil, as Brookston and Napanee, superphosphate (0-20-0) is the chief requirement for most crops, with the quantities of nitrogen and potash varying from nothing to medium amounts depending on the crop requirements. On the sandy soils, as Fox, a complete fertilizer high in phosphate with low to medium quantities of nitrogen and medium to high percentages of potash are advised. Soils of medium texture, as Hillsdale or Isabella, require a fertilizer with large amounts of phosphorus and small to medium amounts of nitrogen and potash.

**2. Crop Grown**—All crops respond to adequate quantities of phosphorus. Grain crops need small to moderate quantities of nitrogen and potash. Crops such as potatoes, sugar beets, and alfalfa require relatively large amounts of potash. Grass crops require large amounts of nitrogen.

**3. System of Farming**—Grain farmers need to buy a more complete fertilizer than do dairy or general farmers. Where large amounts of manure are available, phosphorus is usually the only fertilizer needed for most crops where manure is being applied. Other crops will need to be fertilized according to crop and kind of soil.

### Use High Analysis Fertilizers

Manufacturers are gradually turning to the production of higher analysis fertilizer and today any fertilizer not containing 20 per cent or more available plant food is considered of low analysis. The price per ton of a high analysis fertilizer will be greater than of a low analysis fertilizer but the price per pound of plant food will be less, and smaller amounts per acre may be applied. When high analysis fertilizers are used, higher grade plant food carriers must be used and there is less room for so-called filler or bulk material. Those who desire to cut their cost of soil fertilization and to lower their cost of production should use only high analysis fertilizers.

### Use Standard Fertilizers

Standard fertilizers for Michigan as recommended by the Michigan State College Circular Bulletin 53 (Revised) are:

0-20-0 <sup>1</sup>	4-16-8	4-8-28
2-16-2	2-8-10	0-8-24 <sup>4</sup>
2-12-6 <sup>2</sup>	2-8-16 <sup>3</sup>	Nitrate of soda
4-10-6	3-12-15	Sulphate of ammonia
4-16-4	6-9-15	Muriate of potash
0-20-20 <sup>5</sup>		

The fertilizers listed above are sufficient to meet the requirement of any crop on any mineral soil and most crops on muck soils. Dealers find it more economical to stock only a few high analyses of the right kind and it is less confusing to the purchaser. This group of standard fertilizers represented only 40.35 per cent of the total sales in 1928 but, in 1932, it represented 57.98 per cent of the total sales. Other fertilizers may be used but it would be cheaper for the manufacturer to put on the market one standard analysis rather than three or four analyses so similar that little difference in results would occur from their use.

### Factors Affecting Fertilizer Efficiency

**1. Lime**—It is evident from experimental work and from results obtained by farmers that the benefits from the use of fertilizers are greater on soils containing lime than on very acid or "sour" soils. Many of the soils in the State need both lime and fertilizers. If both are needed, lime should be applied first. Lime will not take the place of fertilizers; neither will fertilizers take the place of lime.

**2. Drainage**—A soil must be well drained in order to make the use of fertilizers profitable. It would be a waste of time and money to apply high grade fertilizers on water-logged soils.

**3. Organic Matter**—A soil must have active, decomposing organic matter to make fertilizers most effective. Poor results attributed to fertilizers are sometimes due to lack of organic matter in the soil. Fertilizers will not take the place of organic matter.

**4. Climate**—Rainfall, in particular, has a direct effect on the efficiency of fertilizers. A cold, wet spring will make nitrogen applications more effective.

### Manure Versus Commercial Fertilizer

A ton of manure, as drawn out on the average farm, carries approximately 10 pounds of nitrogen, 5 pounds of phosphoric acid, and 10 pounds of potash, and expressed in terms of commercial fertilizer, would be a  $\frac{1}{2}$ - $\frac{1}{4}$ - $\frac{1}{2}$ . It will be noted that not only is manure low in plant food compared to commercial fertilizers but that the plant food elements are not in the proportion found advisable for Michigan soils. To balance the plant food ratio in manure it is necessary to add phosphorus (superphosphate) at the rate of 25 to 40 pounds per ton of manure.

<sup>1</sup>Similar analyses: 0-24-0, 0-40-0, 0-44-0, 0-45-0

<sup>2</sup>3-18-9, 4-24-12

<sup>3</sup>3-9-18

<sup>4</sup>0-8-32

<sup>5</sup>0-14-14, 0-10-10