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Wartime Recommendations on the Use of Commercial Fertilizer

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An application of 150 pounds of fertilizer per acre more than doubled the wheat yield on this farm.

Missouri farms must produce the maximum for the war with the least possible loss of soil fertility. This can be done only through a well-balanced farming system including the necessary soil treatments of lime and commercial fertilizers to provide a sufficient turnover of soil nutrients for maximum growth and quality of all crops. Most Missouri soils need nitrogen and phosphate and in some cases potash as well, but the need for each of these varies widely in different soils.

Since decaying organic matter, or humus, furnishes over 90 per cent of the soil nutrients used in plant growth, profitable yields of high quality crops are obtained only when a sufficient amount of organic matter is provided to furnish nitrogen and other soil nutrients. This organic matter and nitrogen are best furnished by legumes and by the return of all manure and crop residues to the land. The restrictions on nitrogen in commercial fertilizers during the war make it imperative

that the need for this nutrient be met through the production of inoculated legumes and the efficient utilization of all manures and crop residues.

In order to obtain thick vigorous stands of legumes and improve their efficiency in adding nitrogen to the soil, most Missouri soils require treatments of lime and commercial fertilizers high in phosphate. It has been shown, both experimentally and in the field, that larger returns are obtained from commercial fertilizers when the soil contains sufficient lime to be almost neutral in reaction. Fertilizer recommendations for various cropping combinations under different systems of land use are given above.

WARTIME FERTILIZER RECOM

These Recommendations are Based Upon Analyses Selected by

Previous Land Use	Potash Deficiency Symptoms	Barley, W Rye, O Corn, Sor
No crops, or poor crops, of alfalfa, clover, vetch, crotalaria, lespedeza or grass sod; or no manure applied the last 2 years.	None	4-12-4
	Definite	3-18-9
Full stands and growth of clovers or lespedeza or mixtures of same removed for hay; or permanent pastures or meadows within 1 year.	None	0-20-0
	Definite	0-20-2
Good crops of sweet, red or crimson clover, lespedeza, vetch, crotalaria, soybeans or cowpeas turned under, pastured off or combined; alfalfa for pasture, hay or green manure within 1 year.	None	0-20-0
	Definite	0-20-2
Manure—6 tons or more per acre applied within last 12 months.	None	0-20-0
	Definite	0-20-1

*Nitrogen not obtainable in fertilizers for small grain in fall of 1942.

EXPLANATION OF THE RECOMMENDA

Potash Deficiency—Potash fertilizers may be needed before definite deficency symptoms appear. These symptoms are whitish spots near leaf margins; ruffled or cupped leaves in legumes; marginal scorch; and weak stems, lodging and short internodes in corn, small grains, and grasses. (For further information see your county agent.)

Non-Leafy Vegetables—Non-leafy vegetables are those like potatoes, tomatoes, onions, melons, etc., the leaves of which are not eaten.

Leafy Vegetables—Leafy vegetables are those like lettuce, spinach, mustard, cabbage, etc., the leaves of which are eaten.

SUGGESTED ACRE RATES FOR FERTILI

Barley, wheat, or rye, 150-lb.-200-lb. drilled in as seeded.

Oats, 100-lb.-150-lb. drilled in at seeding time.

Corn or sorghums, 100-lb.-150-lb. in bands ½-1 inch from seed and 1-2 in. deep.

Alfalfa, 250-lb.-300-lb. drilled when seeded, or in old stands.

Clovers and lespedeza, maximum amounts recommended for the nurse crops; clover seeded alone 150-lb.-200-lb.

At present the ratio between the price of fertilizers and the price of commodities the farmer sells is exceedingly favorable to the farmer. Because of this relationship, fertilizer can be used profitably on most crops. Heavier applications are also particularly opportune at this time. They should at least be liberal enough to increase present yields and maintain a sufficient supply of plant foods in the soil for use when these price relationships may be less favorable. This can be safely done, especially with phosphates, when erosion is kept in check since phosphate fertilizers do not leach out of the soil to any appreciable extent.

In applying fertilizers, it is desirable to get a balance of available plant foods in the soil. If a soil is high in available nitrogen, as is true

[MENDATIONS FOR MISSOURI

the War Production Board and Should Supersede All Others

Wheat, ats, thums	Alfalfa, Clovers, Lespedeza, and Non-leafy Vegetables	Grasses and Leafy Vegetables	Tobacco	Cotton
*	4-16-4	10-6-4	4-16-4	4-10-6
*	3-12-12	4-10-6	3-12-12	3-12-12
	0-20-0	4-12-4	0-20-0	4-16-4
0	0-20-20	3-12-12	0-20-10	3-9-18
	0-20-0	0-20-0	0-20-0	0-20-10
0	0-20-20	0-20-20	0-20-10	0-10-20
	0-20-0	0-20-0	0-20-0	0-20-0
0	0-20-10	0-20-10	0-20-10	0-20-10

TIONS GIVEN IN THE ABOVE TABLE

Fertilizer Analyses—First figures in analyses indicate percentages of total nitrogen (N); second, percentages of available phosphoric acid (P_2O_5), and third, percentages of water soluble potash (K_2O). Recommendations are based on land low in available phosphorus and about average in organic matter (about 25 bushels corn land). If organic matter is low (less than 20 bu. corn land), fertilizers higher in nitrogen are preferred; if high (30-40 bu. corn land), use fertilizers with less nitrogen; if very high (over 40 bu. corn land), possibly no nitrogen is needed except for grasses or leafy vegetables.

Substitutions.—The 2-12-6 or 4-24-12 may be substituted for 3-18-9; 0-18-0 or 0-45-0 for 0-20-0; 0-14-14 or 0-12-12 for 0-20-20; 0-14-7 or 0-16-8 for 0-20-10; or 0-12-24 for 0-10-20.

ZERS AND METHODS OF APPLICATION

Grass seedings, 200-lb.-400-lb. drilled in at seeding time.
Grass, old stands, 250-lb.-500-lb. drilled 2-4 inches deep.
Vegetables, 300-lb.-600-lb. (See Mo. Exp. Sta. Circular No. 185).
Tobacco 250-lb.-400-lb. bedded 3-6 inches deep in row or in bands about 3 inches to side and 1 inch below root crown.
Cotton, 200-lb.-300-lb. bedded 4-6 inches deep 2-3 weeks before planting or 2½ inches to side and 1½ to 2 inches below seed.

when a heavy growth of a legume like sweet clover, is plowed under or pastured down, phosphate and possibly phosphate and potash fertilizers should be applied. On the other hand where depleting crops like corn, small grains, timothy, or other grasses, without legumes, are grown continuously, manure and phosphate or a complete fertilizer will give best returns.

Where legumes are grown consistently in the cropping system or where manure is applied, fertilizers containing nitrogen are recommended only for grasses, leafy vegetables and cotton. Where cropping systems with lime and legumes are used and manures and other crop residues are regularly returned to the land, as can best be done in a livestock farming system, a high nitrogen turnover is provided, making it necessary to apply only phosphorus or a combination of phosphorus and potassium.

Fertilizers of High Analysis Require Less Transportation Space

In purchasing commercial fertilizers, preference should be given the higher analyses in order to reduce to a minimum the number of bags needed and the cost of transportation and handling, as well as the cost per pound of available plant food. The number of fertilizer analyses available on the market has been greatly reduced and it will likely become increasingly difficult to purchase *straight* nitrogen fertilizer alone or mixed fertilizers containing nitrogen. For this reason every means should be taken to increase nitrogen production on the farm through the growth of legumes, and to utilize these legumes in the most effective way for improvement of the nitrogen in the soil.

Response of Crops to Commercial Fertilizer

Crops most responsive to fertilizers are fall sown small grains, alfalfa, clovers and grasses. Of the small grains, barley, wheat, rye and oats respond in about the order named. Alfalfa, red and sweet clover are the most responsive of the legumes. The grasses respond most to nitrogen added in the form of fertilizer, legumes or manure. Of the row crops, the sorghums, because of their ability to withstand drouth, will usually give as great or greater returns from fertilizer than corn.

Best results from the use of fertilizers, especially those containing phosphorus, are obtained when they are placed in the feeding zone of the plant roots. The most satisfactory way of applying fertilizers to small grains, grasses, alfalfa and clovers is with a fertilizer grain drill. Where this is not available, fertilizers may be applied broadcast and worked into the soil with the regular implements used in preparing a seedbed. Good results have also been secured by mixing the fertilizer with small grain and drilling the fertilizer mixture through the regular grain box of the drill. When this is done the drill should be cleaned of all fertilizer and well oiled after use. For row crops the newer fertilizer attachments for placing the fertilizer 1-2 inches on the side and about one inch below the seed are recommended.