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The Use of Fertilizers During the War



FERTILIZERS BRING INCREASED YIELDS

There are thousands of fields in Wisconsin on which the right fertilizer will produce larger crops. The larger shock includes the corn cut from 10 hills on the fertilized part of a field; the smaller shock 10 hills on the unfertilized part.

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Use of Fertilizers During the War

A. R. WHITSON

More food can be produced either by the expenditure of more labor, making possible the cultivation of more land or by the use of fertilizers, which will secure larger yields on the same or less acreage.

More labor is not available this year, fertilizer is; hence, the extreme importance of fertilizers under present conditions. The cost of fertilizers ranges from \$2 or \$4 an acre, when used on manured land for corn, potatoes, or grain, up to \$14 to \$16 an acre when used without manure for potatoes or other intensive crops. When the fertilizer is properly used, every dollar spent will be returned more than two-fold.

COMMERCIAL FERTILIZERS AND STABLE MANURE

Stable manure has been practically the only fertilizer generally used in Wisconsin and doubtless will long continue to be the most important fertilizer used in the state. But comparatively few farms have enough manure to keep the yields up to what the land is capable of producing.

Moreover, stable manure is not well balanced as a plant food. It is relatively low in phosphorus, and on farms on which much stock has been kept for some time it will be found that the use of phosphate in addition to manure will produce marked benefit. It will cause the better filling of small grain and hasten the maturing of corn and grain.

Phosphate fertilizers to supplement stable manure may be either the raw rock phosphate which can be used in the gutters of cow stables at the rate of 50 to 100 pounds for each ton of manure produced, or acid phosphate at the rate of 30 to 40 pounds a ton of manure, which can be added to the manure either directly by scattering it on top of the manure spreader or by spreading it broadcast on the land and disking it in the soil when preparing for seeding.

FERTILIZER FOR DIFFERENT SOILS

The amount and kind of fertilizer which should be used depends on the kind and condition of the soil and on the crop. Where considerable stable manure has been used during the last five years, or on a clover sod, the fertilizer should be chiefly a phosphate fertilizer. This is true also on good upland soils which are high in organic matter, such as black prairie soil, even though it has not been manured. The increase in the yield of corn from the use of phosphate fertilizers on black prairie soils is often 25 to 50 per cent, and in some cases more.

Upland clay loam soils relatively low in organic matter, such as those which occur most generally in the southern and north-central portion of the state, need nitrogen as well as phosphorus, and unless stable manure is being used this year, or has been used recently, or unless clover has been grown recently, the fertilizer which will give the largest yield, though not always the largest net profit, is one containing 2 to 3 per cent of nitrogen and 8 to 10 per cent of phosphoric acid. The nitrogen will give the crops a good start in the spring, whereas without this element the growth would be slow until the ground is warm enough to permit more rapid nitrification of the nitrogen already in the soil.

Heavy clay soils, such as those which occur to a considerable extent in the eastern and extreme northern part of the state, especially need phosphate fertilizers to hasten maturity of the crop and make the grain fill well. A large number of experiments on the heavy red clay of the extreme northern part of the state show that clover hay is increased from 25 to 45 per cent, potatoes from 40 to 50 per cent, clover seed from 50 to 60 per cent and practically all other crops to an extent which would make the use of phosphate fertilizers profitable. On these soils phosphate fertilizers should be used whether nitrogen can be supplied or not, but unless stable manure has been used or clover grown recently a fertilizer containing 2 to 3 per cent of nitrogen as well as 8 to 10 per cent of phosphoric acid produces still better results.*

On sandy soils the growing of clover or other legumes as a

* For further information send for Wisconsin Bulletin No. 202, "How to Improve Our Heavy Clay Soils."

means of adding nitrogen and humus is the first step. The soils should first be limed to correct acidity. Two hundred pounds of acid phosphate to the acre will still further increase the growth of clover. The use of a light seeding of rye as a nurse crop will protect the sand from blowing. This should be thoroughly disked in when preparing the ground for seeding to clover in the spring. Seeding should be followed by the use of a heavy roller to compact the soil, either using a corrugated roller or dragging the soil lightly after rolling it. When this method has been followed, yields of clover have been grown on sandy soils so poor that no catch could be secured in the usual way. The use of hay as feed for stock and the return of manure to the soil or the plowing under of the clover will add large amounts of nitrogen, and the fertility of sandy farms on which much clover is grown can be maintained by the use of a phosphate fertilizer every three or four years in the rotation. Potash should also be used when available at reasonable prices.

Unless clover or manure is used, the fertilizer for sandy soils must contain 2 to 3 per cent of nitrogen as well as 8 to 10 per cent of phosphoric acid, with or without potash, and be used at rates indicated in the paragraph on methods of application. Complete fertilizer containing all three elements can be used on sandy soils with profit only when intensive crops are grown and unusual care given.*

Marsh soils are naturally very high in nitrogen but low in phosphorus and potash. Marsh soils of southern and eastern Wisconsin contain somewhat more phosphorus and thus are less in need of a phosphorus fertilizer than those of the central and northern part of the state, but they need potash. In many cases marsh lands in southeastern Wisconsin which give extremely small yields of corn, cabbage or other crops have been found to produce first class yields when only 100 to 200 pounds of muriate of potash has been used.

Fertilizers containing only potash are practically unavailable at present and the best substitutes are either dry unleached wood ashes, at the rate of a ton to the acre, or strawy horse manure. On marsh land in the central part of the state where phosphate is needed as well as potash, it is prob-

* For further information, send for Wisconsin bulletin No. 204, "Ways of Improving Our Sandy Soils."

able that brands of fertilizers containing 8 to 12 per cent of phosphoric acid and 2 to 3 per cent of potash will be found profitable on most crops, but even here the ashes or horse manure supplemented by 200 to 300 pounds of acid phosphate to the acre, will give equally good results at less cost.*

LEGUMES, LIME, AND INOCULATION†

The growth of clover, alfalfa, soy beans, or other legumes which have the power of gathering nitrogen from the atmosphere, is by all means the cheapest method of securing nitrogen. Legumes should be grown for this purpose even in cases where they are not used for feed but are turned under as green manure. They are essential where stock is kept, and when they are used as feed an important part of the nitrogen is returned to the soil in the manure. The importance of the use of lime on these crops cannot be overestimated, and lime is also helpful on acid soils for other crops. Until legumes are established, inoculation is important.

THE RIGHT FERTILIZERS FOR THE DIFFERENT CROPS

While it is true that the yields of all crops can be increased by the use of fertilizers it is also true that certain crops will pay more largely than others for the money expended in fertilizing them. Among the staple crops which, at present, will probably yield largest returns for money expended for this purpose, are potatoes and corn. Special crops such as cabbage, onions, and peas for canning purposes are also valuable and the yield of small grain can be increased materially.

HOW TO APPLY FERTILIZERS

As far as possible, all fertilizers should be mixed well with the soil to a depth of six inches. They may also be applied with good results in the spring as a top dressing on grass or crops sown in the fall before, especially in those cases in which nitrogen is used. Less benefit will be secured during the first year from phosphate thus applied because much of

* For further information send for Wisconsin Bulletin No. 205, "The Improvement of Marsh Soils."

† For further information, send for Wisconsin Bulletin No. 230, "Soil Acidity and Liming," and circular 96, "The Inoculation of Legumes."

that element is absorbed by the surface soil before it reaches the roots of the crops, but it will be mixed with the soil in preparing for the next crop and that crop will benefit by what the first crop left.

In the case of crops planted in hills or drills, the fertilizer can either be spread broadcast and disked in or else applied near the hill or drill. Attachments for applying it in the hill are made for most corn planters. Most grain drills are also made with fertilizer hoppers and there are several good fertilizer distributors on the market. The fertilizer can also be spread broadcast by hand, as in seeding grain, or by using a small shovel from a wagon driven slowly. Fertilizer applied broadcast so that it will be incorporated with the whole body of soil will be within the reach of the crops planted in hills and drills during the year these crops are on the ground, and what is left will be available to grain or hay crops following. However, it is probable that under the present extraordinary conditions larger returns for the money expended can be secured by using the fertilizer in small amounts applied at the hill with a drill. In the case of corn, 100 to 125 pounds of fertilizer applied with a corn planter having a fertilizer attachment, which drops it near the hill, will give good results. Larger amounts to the acre applied in the hills at ordinary distance of planting would prevent germination of the seed.

In the case of potatoes, if mixed fertilizer containing two or three of the essential elements is used, 500 to 1,000 pounds to the acre must be used, and if the potatoes are planted in check rows, the fertilizer must be spread broadcast and disked in. If the potatoes are planted close in the row, 200 to 300 pounds of fertilizer can be applied in the furrow, but the results will probably not be so good and the benefit to the next crop will be less.

THE PRICE OF FERTILIZERS

The price of mixed fertilizers which will probably rule throughout the growing season of 1918 has now been fixed. It is determined largely by the percentage of different elements contained. One per cent of a ton or 20 pounds is called a unit. The price of each unit of nitrogen is between \$6 and \$7, of

phosphoric acid about \$1.75, and of potash between \$6 and \$7. The composition of fertilizers in any particular brand is indicated by simply using figures giving the percentage of ammonia or nitrogen first, then the percentage of phosphoric acid, and last, that of potash. For example 1-8-1 fertilizer contains 1 per cent of ammonia (.82 of a per cent of nitrogen), 8 per cent of phosphoric acid and 1 per cent of potash. Using the figures given above for the three different elements, it will be seen that this fertilizer would cost something over \$25 a ton, while a 1-8-2 fertilizer would cost between \$35 and \$40 a ton, a 2-8-2 about \$45 a ton, and a 14 per cent acid phosphate about \$20 a ton. All prices on fertilizers will vary locally somewhat, depending chiefly on freight rates.*

Untreated ground rock phosphate will cost between \$8 and \$9 a ton at most central Wisconsin points this year. While this has twice as much phosphorus, ton for ton, as is contained in acid phosphate, and costs less than one-half as much, it can be used as fertilizer successfully only when it is thoroughly mixed with a good quantity of actively decomposing organic matter. When mixed with stable manure or applied to marsh soils high in vegetable matter it gives good results the first year and leaves a large supply of phosphorus to become available in succeeding years.

ORDER EARLY TO SECURE DELIVERY

On account of the great difficulty in securing cars this year, it is extremely important that orders for fertilizers be placed early. In that way only will it be possible for Wisconsin farmers to get the fertilizers they need. The bulk of the fertilizers should be delivered during the winter months. This need not cause financial difficulty to the farmer because most of the large fertilizer companies are now establishing agencies in the state and the fertilizer can be purchased from these agents to be paid for as late as July. Additional reasons for placing orders early are that cars can be secured much more readily and the cost for freight will be considerably less when the fertilizer is shipped in full carload lots, which is possible only when the agent receives orders early. Fertilizers can be delivered at small towns or way stations, when ordered from

* The use of these mixed fertilizers is in general advocated only during the abnormal conditions due to the war.

agents in the larger towns, by the payment of the local freight from the central point to the local station, in addition to the carload rate to the principal station. Farmers should group their orders and the county representatives can give much assistance in placing orders.

Until this year the fertilizer firms have had few agents in Wisconsin. Now most of the large firms have several agencies so that an agent of one or more firms will be found in practically all of the large towns of the state. Advertisements of fertilizers will be found in the agricultural papers.

THE PROPER CARE OF THE MANURE

Proper care in the preservation and use of manure is of the utmost importance. The essential thing is to prevent leaching and fire fanging, or burning out. Mixing horse and cow manure will do much to prevent over-heating. To prevent leaching, the manure should be drawn directly to the field and spread each day. When this cannot be done the manure may be allowed to collect for a few weeks in a compact pile in a shallow cement lined pit or under a shed. The straw and droppings from the barnyard should be placed in the pit and the tramping of stock will compact it.

NITRATE OF SODA FROM THE GOVERNMENT

The Federal Government is planning to import nitrate of soda from Chile and sell it to farmers at cost, during the war, but it is doubtful if it can be secured in time for use this year. This is a very soluble and available nitrogen fertilizer. It can be used to advantage, especially on soils not well supplied nor recently manured with organic matter. Moderate applications of 80 to 100 pounds to the acre may be applied broadcast at time of seeding or planting and in the case of potatoes, sugar beets, or other intensive crops, a second application should be made and cultivated in when the crop is one-third grown. See your county agent for conditions under which this nitrate of soda may be secured.

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