

Lime as a Fertilizer.

Editor "The Farmer's Advocate":

1. Would it pay a farmer to build a place and burn limestone, to use lime as a fertilizer for his farm?
2. Is lime of much value to land as a fertilizer?
3. What amount should be used to the acre?
4. Is lime of more value to the land than wood ashes?

W. J. M.

King's Co., N. B.

Ans.—Perhaps no material has been used with such varying results as lime. On some soils it produces wonderful results, while on others its effects are not appreciable.

Lime is one of the essential plant-food constituents, and as such must be present in the soil in sufficient quantities to supply the needs of the growing plant. But, as most soils have an abundance of lime for this purpose, the value of artificial applications is more in improvement of the physical condition of the soil and in the liberation of plant food.

Lime enters into so many chemical reactions of the soil that Hilgard states, in his recent book on "Soils": "Its presence exerts a dominant and beneficial influence in many respects. We find lower percentages of potash, phosphoric acid and nitrogen are adequate when a large proportion of lime carbonate is present." If, then, lime is not present in sufficient quantities, or if it is present in an inactive form, the application of lime will probably give good results. If, on the other hand, there is an abundance of lime in the form of carbonates, and this is the state in many soils, and the physical condition is right, no good results will follow the application of lime. Reclaimed swamp lands and clay soils are usually the most in need of lime. It has been frequently noticed that naturally wet soils, or land in moist climates, are the most benefited by lime.

Lime improves soil in several ways. Besides supplying calcium, which may or may not be directly needed by the plant, it corrects any undue acidity; it improves the physical condition of sands by binding the particles of the sand together, much as lime and sand act together in making mortar, and it improves clays by gathering the fine particles of these soils into larger ones, and thus destroys their natural tenacity. It is essential, in order that good crops may be grown, that the open spaces between the particles of the soil shall be neither too small nor too large. In stiff clays these open spaces are small, because the particles are small; further, as the water in a drained soil is held in the form of a thin layer around the particles, the smaller the particles, the greater the surface presented and the greater the water content of the soil. Such a soil holds a great deal of water, but holds it so firmly that plants growing on it may be suffering for want of water, although there may be more water present than would be needed to give good results on a soil made up of coarser particles. Lime tends to gather these small particles into larger groups, presenting less surface for holding water, and the open spaces between the groups of particles are larger and not so uniform in size, which allows for better aeration of the soil and a freer movement of the water between the open spaces. In this way, then, lime destroys the tenacity of clays, renders them more easily drained and better aerated. Every farmer knows the importance of having the soil in a good physical condition, and the effect such a change would have upon the crops grown on that land.

Lime appears to cause many chemical reactions to occur in the soil. Among others, it causes potash to be liberated from insoluble forms of combination in such a form that plants may use it. Thus, lime indirectly supplies potash, and, as clay soils contain large quantities of insoluble compounds containing potash, lime is particularly valuable upon this class of soils.

Wood ashes contain potash and large quantities of lime in the carbonate form. Wood ashes are, therefore, a direct fertilizer, because they contain an essential constituent of plant growth, whereas lime supplies nothing but lime. On certain soils it may indirectly furnish potash, by liberating it from compounds in the soil; consequently, as a fertilizer, lime is valuable chiefly for its indirect action in liberating plant food, and is in one sense a stimulant.

At one time lime was used in Scotland in very large quantities; as much as twelve tons were sometimes applied per acre. Such quantities were bound to be injurious, in that the good physical condition obtained from the use of moderate quantities may be destroyed, and it also liberated too much potash, or it over-stimulated the soil. The following couplet represents the general idea to-day:

Lime and lime without manure,
Makes the father rich but the son poor.

As lime liberates potash, it generally gives its best results on clay soils, and for crops requiring large quantities of potash. The legumes are our heavy potash-feeding plants; consequently,

lime should be applied as a top-dressing, and thoroughly worked into the ground before sowing peas, beans, etc., or before seeding down with clover. Gypsum, the sulphate of calcium, seems to be particularly suitable for the clover, and is frequently sown on the clover early in the season.

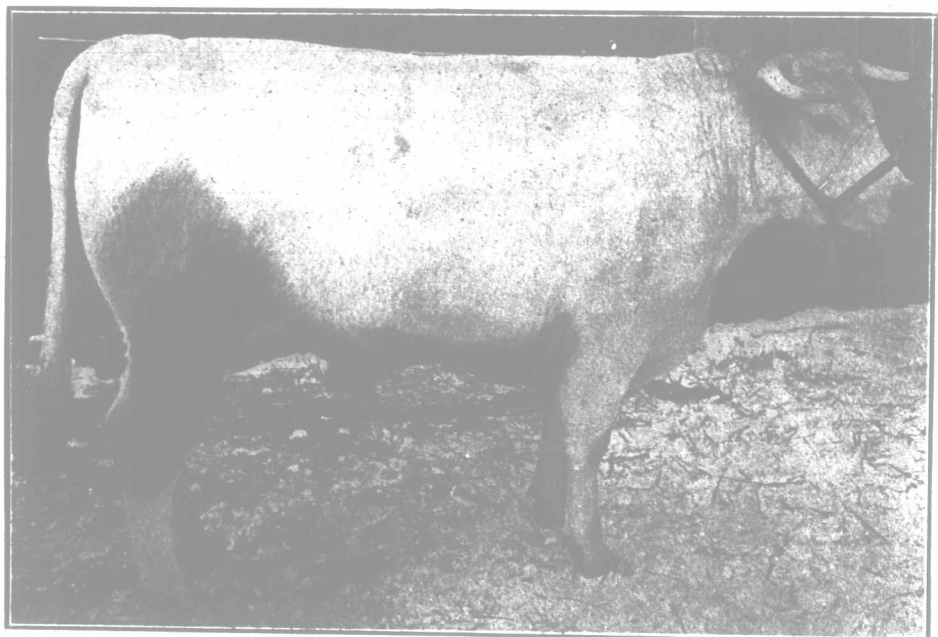
Where lime has been shown by experiments to give good results, it should be used in moderate quantities. It is better to apply small quantities at frequent intervals than large amounts at long intervals. If quicklime is to be used, a good plan is to put down about one bushel of lime in heaps 2 rods, or 33 feet, apart, cover with a little earth, and it will quickly slake, then spread with a shovel. This will give one bushel to a space 33 feet square, or 40 bushels per acre. Such an application may be made every five or six years, without fear of overstimulating the liberation of potash.

Lime is a valuable fertilizer on some soils, but it should be established by small experiment, whether lime is needed, before extensive applications are made. It is extremely doubtful whether it will pay a farmer to burn lime for his own use. From the above, it will be seen that comparatively small quantities of lime are wanted, and, considering the labor and expense of making the kiln, getting out stone and burning it, I feel sure that it would be more economical to purchase the lime.

The finely-ground limestone rock is being used in some localities with fair success. It is not so active as the lime, and does not break down the humus of the soil so rapidly, which may be an advantage on some soils. It must be in a very finely-divided condition and very evenly distributed over the ground to give its best results. Naturally, it would be applied for the same crops as lime. Practically the only source of this ground limestone rock in this country is from stone-crushing plants. Usually, the stone dust can be purchased for about 50 cents per ton. Whether the dust is from limestone or feldspartic rocks, it is probably well worth the money if fine, and if well applied.

O. A. C.

R. HARCOURT.



Royal.

Pure-bred Shorthorn steer. Age two years and two months. Winner of first prize in class at Ontario Provincial Winter Fair, Guelph, 1908. Bred and exhibited by John Barr, Blyth, Ont.

Irrigation in Western Agriculture.

The earliest agricultural operations known in history were developed under tropical conditions on the continents of Asia and Africa, with arid climatic conditions and a soil incapable of producing anything without the aid of irrigation. The use of artificial watering in connection with crop production naturally followed. In fact, agriculture was an impossible proposition without it. The Book of Books in more than one place bears witness to the antiquity of irrigation. In the Book of Deuteronomy it states: "For the land, whither thou goest to possess, is not as the land of Egypt from whence ye came out, where thou sowedst thy seed and wateredst it with thy foot as a garden of herbs. But the land whither thou goest to possess it, is a land of hills and valleys and driest water of the rain of Heaven."

IRRIGATION A VAST AGRICULTURAL FACTOR.

In the course of time, migration took place to more northerly latitudes, where humid conditions exist, and birth was even given to "dry" farming, i.e., farming without irrigation. The impression prevails amongst all classes of people that farming under irrigation is a novelty. Some foolishly call it a fad. Those who know the history of irrigation and the great part it has played, and

is playing at the present time, in the civilization and development of the world, entertain entirely different views. Irrigation is a most antique system of farming.

THE EDUCATIONAL PROBLEM.

In colonizing irrigated lands in Southern Alberta, those interested have been face to face with a vast educational propaganda. It has been found a difficult matter to draw people from the irrigating States of the Union, for the simple reason that the farmer on irrigated lands there is much too prosperous to migrate. Furthermore, colonization of irrigated lands south of the line is generally of recent origin, and the conditions are not, therefore, as ripe for an outward movement of people as in the more easterly portions of the United States and Canada. In the latter districts, however, the art of irrigation is unknown, and in order to convince the intending settler that an irrigated farm in Southern Alberta is a desirable proposition, the danger becomes imminent of conveying the impression that Southern Alberta is an arid country. Nothing could, of course, be further from the truth. The average rainfall of Southern Alberta is about the same as that of the southerly portion of the Province of Saskatchewan, containing its vast wheat fields, and only slightly lighter than the average rainfall for the Province of Manitoba. The fact is, that irrigation has a special mission of its own, entirely apart from cereal-growing, in the production of alfalfa and other perennial fodder crops where summer-fallowing cannot be resorted to every second year for the purpose of moisture conservation.

THE APT ONTARIO FARMER.

Artificial watering as an aid to crop production has been practiced for years in the Provinces of British Columbia, Alberta and Saskatchewan with uniform success. The idea that irrigation is a class of farming difficult for the average man to master is quite an erroneous one. The application of water to the soil is not nearly so complicated a matter as conducting the ordinary cultivation and harvesting operations of the ordinary farm. The district south of Lethbridge is principally settled by the Mormon Church, and the

citizens of that town prevailed upon the land company to set apart a certain area immediately surrounding Lethbridge for colonization by Ontario farmers. It is a peculiar fact, that to-day the Ontario farmers, who had never seen an irrigation ditch in their lives until they went West, use water more skilfully and intelligently than the Mormons do, who were practically brought up on the irrigated lands of the State of Utah.

SUMMER-FALLOWING SUPERSEDED.

The general agricultural practice throughout Manitoba, Saskatchewan and Alberta is tending more and more towards confining crop production to summer-fallow lands. It has become the

universal practice through all the Pacific wheat-producing States; in fact, wherever farming under light rainfall conditions prevails. The introduction of the summer-fallow principle has revolutionized farming operations in the sub-humid belt of Western America, where the average annual rainfall ranges below 20 inches. To this belt belong all the States west of the Missouri River and east of the Rockies, as well as all our prairie provinces. The chief object is to store in the soil two seasons' moisture for the purpose of producing each crop. The land lies idle during the summer preceding the crop, during which time it is treated to periodic surface culture. The general introduction of summer-fallowing will practically remove the danger of crop failure through drouth, such as is apparent in a good many portions of the West to-day.

With an abundant supply of moisture available by artificial means, the main object of summer-fallowing largely disappears. It, therefore, follows that summer-fallowing will be eliminated on irrigated lands, thus leaving the whole crop area available for production each year, instead of one-half of it.

IRRIGATION OF CEREAL CROPS.

While the irrigation of cereal crops is not expected to be a leading feature of the development of the irrigated areas of Southern Alberta, for