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Potash is indispensable to the formation of carbohydrates—the starches of potatoes, grains, etc., the sugars of fruits, root crops, vegetables, etc., and the fibrous matter of plants.

A ton of well-made mixed horse and cow manure, in which the liquid part has been carefully conserved, may contain approximately 10 pounds of nitrogen, 5 pounds of phosphoric acid and 10 pounds of potash. A serious depletion of these valuable constituents occurs when the manure is subject to losses by fermentation and leaching. Horse manure, being open in texture, will ferment more readily than cow manure.

Where the manure cannot be conveniently taken from the stable and spread on the land immediately, the horse and cow manure should be mixed together and kept in a fairly compact heap with adequate means such as concrete or clay foundation and abundant absorbent material—to prevent loss by leaching. Of course, a certain loss of fertility is inevitable, but proper care will reduce it to a minimum.

The importance of these precautions is manifest in the fact that more than one-half the nitrogen and three-fourths of the potash in the total manure are present in the liquid portion.

The value of manure in the soil is based not alone on the fertility which it contributes, but also—and perhaps to a greater degree—on its physical and biological functions.

The exertion of its physical influence may be noted in the improved texture of a soil, be it heavy clay or light sand, which has received a needed application of manure.

It acts biologically in both furnishing and maintaining the favorable bacteria through whose instrumentality plant food in the soil is liberated and prepared in forms suitable for crop use.

One of the most important soil processes dependent on bacterial agency is that of nitrification which involves the breaking down of the humus (partially decomposed organic matter), the liberation therefrom of nitrogen or ammonia and, by further steps, the evolution of a nitrate—the highly oxidized form in which plants assimilate nitrogen.

Besides air and moisture, a certain degree of warmth is essential to nitrification. Hence, in the early spring, before conditions have become favorable, there may be a lack of soluble nitrates in the soil and spring-sown grain crops, as well as fall wheat, would consequently suffer thereby.

When, for instance, the young oat plants have exhausted the reserve of food stored in the seed-grain the "weaning" stage—they become dependent on the soil for their nourishment and, at first, often find difficulty in obtaining the soluble nitrate nitrogen—so essential in the early development of all crops.

Nitrogen in every form, save the nitrate, must first undergo conversion in the soil before becoming assimilable by plants. Nitrate of soda is, therefore, the quickest acting nitrogenous fertilizer, being very soluble and its nitrogen immediately available. To these important and desirable qualities it owes that popularity and place of pre-eminence accorded it by recognized authorities in the domain of agricultural chemistry. Many a grain crop has been saved by a timely application of 75 or 100 pounds, per acre, of nitrate of soda in the spring. Under favorable conditions the noticeable response of the crop to this treatment is usually almost immediate.

"STANDARD" FERTILIZER MATERIALS.

While nitrate of soda ranks first among sources of nitrogen, superphosphate (acid phosphate)—likewise because of its quick action—holds the same position among sources of phosphoric acid. As a source of potash, muriate of potash is most generally and extensively employed, although tobacco growers and some potato growers prefer the sulphate of potash.

The potash salts, excluded during the war, are now coming into Canada again and not only from Germany, but from the repatriated French province of Alsace where some of the more recently discovered and richest deposits are situated.

The farmer ought to become thoroughly conversant with these fertilizer materials, which are of constant standard composition, in order that they may serve him as a basis for the valuation of nitrogen, phosphoric acid and potash in various forms and mixtures. Here are the data: Nitrate of soda contains 15½ per cent. of Nitrogen; superphosphate (two grades) contains 14 or 16 per cent. of available phosphoric acid; muriate of potash contains 50 per cent. of water-soluble potash. All leading fertilizer firms stock these separate materials, as well as their own special mixtures.

FACTORY-MIXED FERTILIZERS.

Ready-mixed brands are numerous and vary widely both as to percentages of plant food and the nature of the materials entering into their composition. A great many—probably the majority—have tankage as their base and are reinforced by nitrogen or potash or both, according to the formula desired.

Unfortunately, the persistent demand for a "cheap" fertilizer is responsible for the presence on the market of a large number of brands of distinctly inferior quality. Naturally they contain very much less plant food, but more "filler", and are really dearer than the high-grade brands.

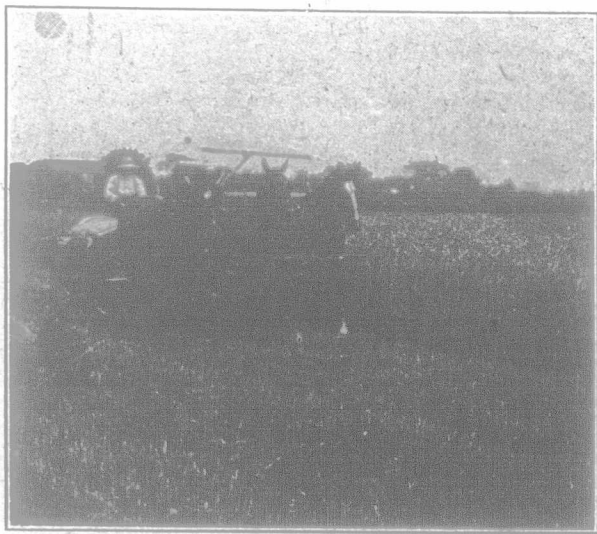
Among users of low-grade fertilizers the writer has seldom found one who could remember, even approximately, the percentages of plant food present, whereas the price paid per ton was usually readily recalled, thus indicating that the relation of price to composition was ignored.

Either through ignorance or with intent to deceive some fertilizer agents make absurd and extravagant claims for the goods they sell. Such is fortunately now less frequent in Ontario, for reputable fertilizer manufacturers are becoming more insistent on a true representation of their products. To meet the demand for a moderate priced fertilizer, certain manufacturers have produced an inferior material containing only a very small percentage of plant food and a larger percentage of carbonate of lime. Now carbonate of lime is not, strictly speaking, a fertilizer, but is primarily useful in correcting soil acidity and, furthermore, it may be purchased in the form of ground limestone (practically pure carbonate of lime) for \$3 or \$4 per ton. It would, therefore, be folly to pay a high price for carbonate of lime in a fertilizer.

In buying fertilizers, the farmer should see that he is paying only for the nitrogen, available phosphoric acid and potash therein and not being overcharged for these.

The next article will deal with the subject in somewhat greater detail and relation to the peculiar needs of various crops and soils.

(To be continued.)



A Fertilized Field of Grain.

This field of fall wheat received a spring application of nitrate of soda at the rate of 120 pounds per acre.

Do Not Plant Small Seeds Deeply.

EDITOR "THE FARMER'S ADVOCATE":

Why waste two-thirds of your clover seed? That sounds overdrawn, but from close observation and experience in clover and other similar seeds, the writer believes that at least two-thirds of these seeds are buried so deeply they never see the sunshine, or if they do they are so yellow and tender it kills them at first sight. Just here I want to ask the reader, where does nature sow her small seeds, and where do the most experienced seedsmen sow their small seeds? Scientists tell us not to sow deeper than five times the thickness of the seed planted. The writer has had more or less experience with seeds for over fifty years, and has found that all those seeds that start the root downward first and then shove the seed out of the ground before the two small leaves are released, such as clover, rape, cabbage, onions, lettuce, etc., should not be over one-fourth, to one-half an inch in the ground. I have always got my best results and healthiest, big, thick, green leaves of clover when sown on top of the ground in the winter wheat. That is where nature sows all those kinds of seeds, and it does not take a close observer to find even more weed seeds growing on top than one wants. I have tried lettuce and cauliflower seed that would not come up when sown in trenches an inch or so deep, but when sown on top of a level surface with scarcely enough earth sifted over it to hide the seed and covered over with a thick, damp cloth every seed seemed to grow. This being true, what becomes of one's forty-dollar-a-bushel clover seed when one sows it before or after the ordinary farm drill? If one will use his eyes and brains two minutes he cannot help but see that two-thirds of the seeds fall in the trenches made by the drill teeth, often three to four inches deep, and then below the chunks of earth that roll in on them. How can any reasonable person expect that small root to shove that blunt seed up through those chunks and two or three inches of earth, and that often baked so hard with rain and wind that only the harder and stronger grains that stay under ground to nourish and push their blades to sunlight can possibly get through. It is a blessing that nature has so endowed the staff-of-life producer with a germ that will actually sprout and grow four times after the sprouts have been broken off. My object in writing this is to get reasonable men to think, and to try and adopt some plan to save at least twenty-five dollars' worth of seed on an eight-acre field. My plan the last two years I farmed was to roll after the drill, then sow my seeds with broadcast crank seeder, and use a very short-tooth, light harrow. This means a little extra (and oftentimes needed) work, but I know that two quarts of good seed will seed an acre if properly put on the ground, for I have seen once in my time only one quart of timothy to the acre sown in the fall, after the wheat was up, make a splendid fourteen acres of timothy meadow the next year after the wheat was harvested. I am satisfied from my own experience that nearly all grains are

planted two to three inches too deep, as it is against all nature to place any grain down in the wet, cold ground as deeply as it is plowed, which is quite often done in mellow ground. Corn one inch will outgrow that put in four inches. Potatoes are an exception, as I have tested them at different depths and find the rule applies to them five times their thickness. Five inches proves best for me in a clay-loam soil. Seeds are too scarce and high in price to follow Dad's wasteful way of using five quarts to get two or three pints to grow. And remember this, if two quarts sown on a level surface won't give you a good stand of plants, six quarts won't—before or after the drill. Try it, brother farmer.

Elgin Co., Ontario.

G. H. CAUGHELL.

Governing the Rural School.

EDITOR "THE FARMER'S ADVOCATE":

In a recent issue I read a letter from "Rural Teacher" telling us that many teachers are looking forward to the township board as the dawn of a brighter day. I do not think that any conscientious gentleman would care to run for such a position, knowing that it is the duty of parents to educate their children and of necessity employ suitable teachers. Of course, there is always a class of men who will do anything for money, and this class would, without doubt, constitute this board. If teachers were not responsible to parents I very much fear they would become indifferent and careless. If the mother of the Kaiser, the daughter of our good Queen Victoria, had engaged her own teacher to educate her own son he might have been a blessing to his country. But that great Kaiser power and selfishness usurped the rights of the mothers of Germany, and consequently she raised a nation of criminals.

To-day we have in this fair land of ours petty kaisers trying to grab this power by advocating township and county board, and closing our rural schools to build consolidated schools. We mothers of Ontario are looking to far-seeing men like Mr. Davidson and all our rural school trustees to protect our rights and keep the gates of our rural communities closed to militarism. Germany was a highly-educated nation. Universities, colleges, technical schools and all manner of educational institutions filled her land. Her teachers were competent men of experience with salaries based, no doubt, on the quality of brick and plate glass in the institutions where they taught. Enthroned selfishness ruled Germany. All her education had no power whatever to direct her ideals toward the things of the spirit to illumine her conscience or awaken in her any moral sense. The most highly-educated men in Germany have lauded her selfish intentions and endeavored to justify her most cruel deeds. Let teachers beware of this monster and take or rather point to the unselfish, self-denying, service-giving and loving Saviour as our model of perfection in our rural schools.

Peel County, Ont.

RATEYER.

The Agricultural Outlook.

EDITOR "THE FARMER'S ADVOCATE":

While orators are blaming the fiscal policy of the country for the exodus of the rural population to the cities, some writers, and lecturers have been just as positive that the reason lay in the lack of a proper community feeling. They have advocated stimulants to the social life of the country districts in the shape of community halls, and co-operative associations for doing everything from family washing to harvesting the ice crop. If only the young people can be interested, they say, and have suitable surroundings they will stay on the farms. According to some political bagpipers, vacant farms point to the fact that the farmers have got discouraged by the impossibility of competing against unjust tariffs imposed by transportation, and middlemen in the handling of their produce. Unwittingly they have stumbled on the very reason for depopulation of the farms. Could a census be taken of the farmers who have left the land it would most likely be found that they were men whose farming was of the rule of thumb type; men whose strength no longer availed against the demands of increased production under old style methods, and in fact, men who have supplied the orators with the statistics they use to show that farming doesn't pay. It is a case of the survival of the fittest at last with agriculture and the fittest in the future will be young men of strength of character, and mind as well as of body. If farming didn't pay why should so many firms advertise costly manufactures in farm journals? Advertisers are human like the rest of us, and they expect some return for the money they spend in advertising. And what is more they get it. Now do you suppose that automobiles, tractors, and other expensive machines so advertised are not bought and paid for by farmers. Of course they are and the farmers of the future will buy more and more of them but there will not be so many farmers. The day of the man on a 100-acre farm with two or three horses, doing the work himself aided by the members of his family, including his wife and daughters, is going never to return. Hereafter the young men who farm will do it on a scientific basis. There will be no more guess work about soil values and more attention will be paid to balanced rations for farm animals. There will no longer be any scrubs allowed, but high-grade, typey herds of cattle, and flocks of sheep will graze on properly rotated fields. The tendency will be to acquire more land under one guiding head, and the consequence will