ficial by virtue of their physical action, and so must be regarded in the light of a medicine rather than a food. How these applications "enrich the father and impoverish the son" is now apparent, but this proverb is only superficially true, for riches consist of the wealth stored up in the soil as well as the money hoarded up in banks, mortgages, or other securities; so that the father is in reality not enriching himself by impoverishing his son. The fertility of a soil can only be maintained or increased by means of those applications which are deficient in the soil and are essential to the growth of plants. It must be borne in mind that a soil may be deficient in a constituent for one plant, but may contain abundance of it for other plants.

In making experiments, if you have suspicion that the soil is deficient in more than one constituent of plant food, you should use a mixed fertilizer,—that is, nitrogen with phosphoric acid or potash, as the case may be.

1. *The Uses of Lime.*—We shall first consider its action on soils that contain an excess of vegetable matter. In a previous article on this subject we stated that organic matter was the natural source of nitrogen for the plant, and was converted into plant food by a ferment (bacteria), and that warmth, moisture and a certain degree of porosity were required to effect this end. Now it is evident that in a cool, moist climate, such as Great Britain, this fermentive process must take place slowly, and it is aided by the action of lime. Some soils which contain an excess of organic matter are too acid or "sour," and this acidity is corrected by the use of lime. On the inorganic portions of the soil lime has a different action. It makes heavy clays more friable and porous, and so aids it in absorbing and retaining the soluble portions of plant food. It also assists in decomposing or unlocking insoluble plant food, making it available for the plant. Figuratively speaking, you will now see that lime is a medicine which aids digestion, and your object should be to bring about those conditions by which the use of lime may be avoided. The natural way of liberating plant food from insoluble combinations, and of making the soil more retentive and friable, is by means of tillage and drainage; and in our warm climate lime is of little or no use on vegetable soils, except, perhaps, when the organic matter is greatly in excess. Besides, your object should be rather to conserve than to unlock plant food, merely unlocking as much as is required for the crop, or even less, making up the deficiency by manures or fertilizers. By tillage, drainage, and the action of rain and frost, the insoluble constituents will become available soon enough. When the plant food is unlocked too rapidly, the day of concentrated fertilizers will draw near. In some sandy soils lime may be applied to test if it is deficient. Leached ashes contain a large percentage of lime, and in the most available form. Pulverized limestone, or carbonate of lime, is another form, but is the least active.

2. *Plaster and its Uses.*—This is the substance which is known under the names of land plaster, gypsum, and sulphate of lime. It is composed of lime and sulphuric acid, and is the cheapest means of supplying sulphuric acid to the soil, but there is rarely a deficiency of these compounds. When bones are dissolved by sulphuric acid a large percentage of gypsum is formed, and goes into the soil with the superphosphate. Some plants take up gypsum very readily, and in this way it has often proved beneficial, but its chief value is due to its action in fixing the ammonia which would otherwise escape from the soil. On grains it has been found to increase the growth of leaf and fibre, but it has had little or no effect on the grain itself. It has been used beneficially on leguminous crops, such as the clovers, but has had little influence on the grasses. The best effects are usually produced on those rare soils which are deficient in sulphuric acid or lime; but as to the fixing of the escaping ammonia, it may be useful on most any soil, especially in a hot season, and thus increase the yield. However, humus has a great absorbent power for ammonia, and if the soil is kept in a proper mechanical condition there is little danger of loss through volatilization. By good farming the necessity for plaster can in most instances be obviated.

3. *Uses of Salt.*—Let us consider separately the virtues which have been attributed to salt. 1. It attracts moisture. The question now to be considered is, what are the causes of defective moisture in the soil? If the surface soil has not the proper mechanical texture,—if it is too porous to admit of moisture rising from below, then the restoration of moisture by artificial means may produce temporary benefits. The lack of drainage may also cause deficient moisture. A dry season, within ordinary limits, has not so much to do with deficient moisture as bad texture and imperfect drainage. Improper texture is frequently caused by too coarse manures. 2. It aids the decomposition of organic matter in the soil. In this action lime may be substituted, and the same objections will apply. 3. It unlocks plant food from insoluble combinations. In this you may also refer to our remarks on lime. All these virtues of salt prove that salt and bad farming go together; for it is an artificial way of doing what should be done by natural means. Although plants will flourish without its use, yet it is an important constituent of plants, and when it is deficient in the soil, which is rarely the case, it will sweeten the vegetation, making the food more palatable and nutritious for man or beast. It checks vegetable growth, but where is the profit in producing a rank growth by means of valuable manures or fertilizers, and then checking it by means of salt? It is also said to stiffen and brighten the straw and produce an earlier growth, but we leave to yourselves the discussion of this virtue of salt.

If you have now diligently perused all these articles, you must have observed that there is something outside of the mere practical rut of farming. There is something in the manure heap which is beyond the scope of ordinary observation, and all the tests which have brought all this knowledge to light have been conducted in the most practical manner, although with regard to those so-called fertilizers which are effective by means of their mechanical action in the soil, scientists are still comparatively ignorant. We have not indulged in any speculative questions which have not yet been settled by investigators. Some experiments have to be repeated thousands of times and under different circumstances before reliable results can be obtained. You have possibly entertained the idea that so long as you obtained good crops, it makes no difference whence the yield springs; but you will now perceive that there is a great difference between getting good crops by exhausting the soil, and getting good crops by maintaining its fertility. So long as you draw more than the interest from your soil, you or your posterity will become bankrupt sooner or later.

(Concluded.)

Seeds and Seeding.

There is no branch of farming in which deception is so easily practiced as in purchases and sales of seeds. They may be old seeds with new names and new prices, and the fraud cannot easily be detected. They may have travelled all over the continent before they reached you. It would pay you to organize farmers' clubs all over the Dominion, if for no other purpose than to know where to purchase honest seeds. The tendency to change seeds is yearly becoming greater, and the swindling keeps pace with it. But the blame for alleged bad seeds should not always be laid to the charge of the seedsmen.

Let us examine what some farmers do. They buy cheap seeds on grounds of economy. No investment can be more ruinous; it is equivalent to a loss of half the crop at least. There would be more money in cultivating half the land by using good seeds, and the labor would be much less. Others buy good enough seeds, but plant too deep or too shallow, or use straw, which they call manure. Others plant at unseasonable times, or on worn out soils, expecting that expensive seeds will make amends for defective or improper cultivation, and exhaustive systems of rotation. By purchasing expensive seeds we do not mean the paying of fancy prices for boomed up varieties.

You cannot understand how to plant intelligently without first comprehending the principles of germination. A seed cannot sprout unless it has moisture, air, and warmth. The young shoot is nourished by the nutriment contained in the seed, and when this is exhausted, no further growth can take place until the leaf comes to the light. If now the seed lies too near the surface, it will likely have deficient moisture, and if too deep, the air may be deficient, and the leaf will not be near enough to the surface, especially if the surface soil is firm. As a rule, large seeds should be planted deeper than small ones.

A great deal of experimenting has been done at the Stations with regard to the germinating powers of the various grains and other seeds at different depths, and it has been ascertained that the largest percentage germinated when planted between one-half and one inch deep, the former depth giving better results than the latter. After one inch the percentage decreases in proportion to the depth. These have been made on soils that were in good mechanical condition, so that if the soil is too rough, too firm, or too porous, those figures should not be regarded as very reliable. These conditions make a wider difference than the size of the seeds.

We have heard enough about beef, fat and tender. Now let us hear something about less waste, and about beef, *lean* and tender.