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The Field.

Leaves from Farming Experience—No. 3.

Rotation continued.

The 5th crop, rye for soiling before the 15th of June, sown in the fall and manured with 18 tons of yard manure, when the cattle have been fed with cut hay, grain and turnips. The straw for bedding should also be cut, to enable the men to handle it cheaply and spread it on grass or plough it down as wanted. As soon as rye is cut for soiling, prepare the ground and sow Swedish turnips. Top-dress them well. Half that field sow with corn, after working the field well and manuring with 18 tons of yard manure, as it is to be cut green for summer food. I made the drills 18 inches apart and sowed the corn thick, over 2 bushels per acre. When well up, I scuffled it two or three times, hoed and weeded it once. It will soon cover the ground. No weed can get room to grow. Top-dress well. An acre will give over 24 tons of green stalks. You will feed with cut grass as soon as the rye is finished. When the clover gets hard, begin at the corn, and that will feed the cows till the second cutting of clover is ready. As that is being cut, sow daily some plaster, and if 20 or 30 lbs. of sulphate of ammonia were mixed among the plaster you will get a third cutting of clover which will feed your cattle to November. The sulphate of ammonia can be brought from Liverpool or Glasgow, delivered in Montreal, at five dollars per 112 lbs. I used it for years with profit. As the corn is cut for summer food, prepare the ground and sow grass seeds as early as you can, to allow a good braird before winter. Sow plenty of seeds, between 30 and 40 lbs. per acre; red clover, 10 lbs.; alsike clover, 4 lbs.; orchard grass, 15 lbs.; sweet vernal, 3 lbs.; timothy, 6 lbs. I have found it a good way to roll the ground first; then sow the grass seeds; then harrow with light harrow, 70 or 80 lbs. to the pair, to cover 19 feet, the teeth two inches exposed, one stroke. Others sow before rolling, and do not harrow. Others sow without rolling, and draw over the ground an article made of thick boards like a door, to rub in the seed, then roll in spring.

Sixth crop, 10 acres grass after corn stalks for soiling, top-dressed with 120 lbs. salt, 50 lbs. plaster, 50 lbs. superphosphate ammoniated per acre, and 10 acres barley or wheat dressed the same as the grass. As soon as the barley or wheat is off the field, prepare it for grass seeds, the same quantity and kinds as stated before, and top-dressed as above.

Seventh crop, hay top-dressed as above stated. You may add 30 lbs. pearl ash, or 3 bushels common ashes would be better. Expect 4 tons hay.

Eighth crop, hay top-dressed the same. In the fall put on 18 tons of farm-yard manure per acre.

Ninth crop, hay top-dressed same way. Then break up for oats.

JOHN ROBERTSON.

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Root Crops—Their Value, Constituents, etc.

It may be taken for granted that when so eminent a chemist as Dr. Voelcker takes a thing in hand, the results at which he arrives may be accepted as reliable. That he has taken up the subject of roots and thoroughly sifted it, will be, therefore, a source of pleasure to many Canadian farmers who want to know something definite about a crop which is becoming yearly more in favor with them. We will not trouble our readers with the mass of statistics which Dr. Voelcker has brought to prove what he advances, but will give the results he gets from them.

The principal roots in cultivation are the turnip, swede, mangold, carrot, parsnip and beet. These plants in the first year of their existence produce an abundance of leaves chiefly from atmospheric food, and, through the medium of the leaves, elaborate the assimilated plant-food into sugar, pectine, albuminous, and other organic compounds, which are stored up gradually in the more or less matured root during the autumn or colder months of the first year. These food constituents, accumulated in the root, are expended again in the second year in the production of a flowering stalk and seed, with the ripening of which the life of biennial plants terminates. Besides atmospheric food—from which, indeed, the bulk of our root crops is derived—certain mineral matters are no less essential to their life and luxuriant development, for experience has supplied abundant proof of the fact that without a sufficient supply of lime, potash, phosphoric acid, and other mineral constituents, present in the ash of turnips, mangolds, &c., these crops do not thrive, and are liable to various diseases, such as finger-and-toe, and at the best produce but a scanty crop.

A crop of turnips, amounting to 17 tons of roots, takes from the soil upon which it is grown as much as 364 lbs. of mineral matters; a crop of 14 tons, 238 lbs.; and 22 tons of mangolds as much as 690 lbs. from every acre of ground. By far the largest proportion of the mineral matters thus removed from the land consists of potash, and the quantity of phosphoric acid taken up by root crops from the soil is also considerable, and much larger than the amount carried off in a good crop of wheat or barley. Root crops thus exhaust the land to a greater extent than cereals of available mineral constituents, and they also exhaust the land rapidly of its nitrogenous constituents. Many persons regard root crops rather as restorative crops in a rotation, whereas in reality they exhaust the land far more rapidly of available plant-food than cereals, if the roots are not consumed upon the land. No crop affords so good an indication of the agricultural condition of land as a crop of swedes or mangolds. On naturally poor soils, or on land exhausted by continuous cropping and grown without a sufficient supply of manure, the poverty of the land manifests itself much more strikingly in the scanty root crop than in other crops of a rotation; and on the other hand, a high agricultural condition, or great natural fertility, shows itself strikingly in the heavy root crops which are raised on such land. This circumstance explains the universal practice to manure the land liberally for roots, more especially for mangolds, which remove more plant-food from the soil than any other root crop. It also explains the policy of consuming the roots upon the land upon which they have been grown.

Dr. Voelcker gives the following table founded on numerous analyses showing the composition of the different root crops:

	Turnips.	Swedes.	Mangolds	Sugar Beets	Carrots (white Belgian)	Parsnips
Water	91.5	89.5	88.5	84.5	87.0	82.0
Albuminous compounds.	1.1	1.5	1.5	1.5	.7	1.3
Fat	.2	.2	.1	.1	.2	.5
Pectine, &c	1.5	1.0	1.0	.9	1.2	1.2
Starch	—	—	—	—	—	3.5
Sugar	3.0	5.0	5.5	9.5	6.5	3.0
Cellular fibre	2.0	2.1	2.4	2.5	3.5	7.5
Mineral matter (ash)	.7	.7	1.0	1.0	.9	1.0
	100.0	100.0	100.0	100.0	100.0	100.0

The amount of dry feeding matter, it will be seen, is largest in parsnips and smallest in white turnips. In the former we have as much as 18 per cent. of dry substance, and in the latter only 8½ per cent. If the different root-crops are arranged according to their percentage of dry substance, we get the following order: 1, parsnips; 2, sugar beets; 3, carrots; 4, mangolds; 5, swedes; 6, turnips. As regards the nutritive or feeding values of these different root-crops, Dr. Voelcker is inclined to rank them in the same order.

Of sugar the largest proportion is in sugar-beets, the other roots following in the same order. The parsnip possesses instead of a certain proportion of sugar, starch which answers the same purpose when mixed with the animal economy, and is converted into sugar when the root arrives at maturity. Unripe turnips and mangolds not only are poor in sugar, but they also contain a number of organic acids, which appear to be the chief cause of the unwholesome properties of unripe roots. If such roots are largely given to stock, it is well known they produce scour, and otherwise disagree with the health of sheep or cattle. Of the organic acids present in roots, oxalic acid, a powerful vegetable poison, is the most important; it has been found in mangolds and sugar-beets, and probably occurs in all unripe roots. Oxalic acid occurs in mangold and turnip leaves in still larger quantities than in their immature bulbs. The presence of this poisonous acid explains the scouring effects produced when cattle are fed upon tops in considerable quantities.

It is a mistake, Dr. Voelcker thinks, to give the enormous dressings of manure to rich clay land, even for mangolds, which some farmers use, and that in many cases a more economical result, and certainly a better quality of mangolds, although not so heavy a crop would be given, if instead the land were manured in autumn with only half the quantity of dung, and the seed drilled in with 3 to 4 cwt. of superphosphate or dissolved bones, which manures have a tendency to produce early maturity in roots. He then gives figures showing that luxuriantly-growing roots always contain more water, as a rule, more nitrogen, and mineral or ash constituents, than less vigorous plants of the same age; and hence large roots, generally speaking, are far less nutritious than better-matured roots of a moderate size. Small mangolds approach sugar-beets in composition, whilst large sugar-beets are hardly better than common mangolds, and monster beets are even less nutritious than well-matured mangolds of fair average size Monster roots, as is well known, are always very watery, poor in sugar, and almost useless for feeding purposes. The practice of giving prizes for big roots, Dr. Voelcker calls childish. "Such roots may delight or astonish women and children; but what is the use of such productions, and why should prizes be awarded to monster roots which generally contain from 93 to 94 per cent. of water?"

Nitrate of soda is considered a useful addition to bone manures, especially for mangolds. Heavy crops of mangolds have been grown on light lands with 1½ cwt. of nitrate of soda, 2 cwt. common salt sown broadcast and 4 cwt. of dissolved bones drilled with the seed. Salt checks over-luxuriance of tops and prolongs the growth period, but in quantities larger than three cwt. per acre diminishes the root crop. The special effect of superphosphate, dissolved bones, and similar phosphatic manures, is to produce early maturity; and hence phosphatic manures are employed in practice very largely, and with much benefit, by root growers. Mineral superphosphate applied alone to stiff soils generally has a better effect than dissolved bones or mixed ammoniacal and phosphatic manures. Dr. Voelcker recommends the increased growth of the sugar beet, which is good advice for Canadian as well as English farmers. It has been proved that the beet-root can not be profitably grown in Canada for the purpose of sugar-making by reason of the too great abundance of some objectionable chemical constituents in its composition. But that objection has no weight against the beet being grown for feeding purposes, and indeed it is very rapidly growing in popularity.

EFFECTS OF ELECTRICITY ON VEGETATION.—Many years ago, I noticed in a paper that if a sheet of zinc were buried at one end of a hot bed, and a plate of copper at the other, and connected by a copper wire laid over the stable manure and under the earth, a current of electricity would be generated which would stimulate the plants in the hot bed to increased activity of growth. I tried it but without effect, so I never repeated the experiment.—*Sarawak, Presqu'ile, Ont.*