

Dr. Maria Montessori

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THE FARMER'S ADVOCATE.

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and red clover do not do well. Where a farm is now growing red clover or alfalfa successfully we would not advise changing to sweet clover. It seems to have its greatest value on poor hill-sides or rough land where other crops cannot be successfully grown.

Artificial Fertilizers; Their Nature and Use VI.

By B. Leslie Emslie, C.D.A., P.A.S.I., F.C.S.

FERTILIZERS EMPLOYED AS A SOURCE OF POTASH.

From a study of the early history of fertilizing, it appears that the materials employed were largely phosphatic and nitrogenous. When Leibig, in his researches about the middle of last century, discovered the importance of potash as a "plant food" and demonstrated the fact that this substance was present in most soils in insufficient quantity for the production of full crops, a new page in the history of fertilizers was commenced. The light of the discovery revealed the cause of certain phenomena, which had hitherto remained obscure. For instance, the increased fertility of soils where wood-ashes had been scattered, had often been observed, and this effect was now traceable to the potash, which the ashes supplied.

WOOD ASHES.

The extraction of potash from wood-ashes for exportation to Europe, where it was employed in various manufactures, was at one time a very important Canadian industry. Wood-ashes have also been used to some extent as fertilizers, but owing to their small and variable potash content and to the fact that no guarantee of the percentage of potash can be given, they are not easily marketable and are too bulky for long-distance transport. However, where conveniently obtainable at a reasonably low price, wood-ashes ought to be utilized. Good unleached hardwood ashes may contain five per cent. potash, but to the writer's knowledge, many samples, thus designated, have shown on analysis only about two per cent. of potash. Wood-ashes also contain small percentages of lime and phosphoric acid.

GERMAN POTASH SALTS.

The source of the world's supply of soluble potash is represented by the German potash deposits, where there are now 160 mines engaged in catering to the ever increasing demand for potash.

Kainit (12.4 per cent. potash).—This is a crude potash salt, which, without further treatment than grinding, is extensively employed as a potash fertilizer in Europe. Owing, however, to the low percentage of potash and consequently high cost of transport, it is not used to any great extent in Canada, where the concentrated salts, muriate of potash and sulphate of potash are preferred. Kainit contains a large amount of sodium chloride (common salt) as well as salts of magnesium and, on account of these impurities, acts as an insecticide.

Muriate of Potash (50 per cent. potash).—Muriate of potash, which is prepared from the crude Carnallite by a process of crystallization, and concentration, is the most popular potash fertilizer, the potash being cheaper in this form than in any other. Muriate is adapted to the requirements of the great majority of crops.

Sulphate of Potash (48 per cent. potash).—This is the proper form in which to apply potash for tobacco, potatoes, sugar beets and small fruits. The chloride of the muriate (chloride of potassium) acts injuriously on the quality of the tobacco leaf, impairing its burning qualities, and is supposed to hinder the formation of starch in the potato tuber. In the case of potatoes and sugar beets this detrimental effect might be obviated by applying the muriate sufficiently early in spring, so that the chloride will have time to combine with lime and other bases and be removed from the top soil before seeding. Sulphate of potash is rather more expensive than muriate of potash as it is produced from the muriate by a further process.

Sulphate of Potash-Magnesia (26 per cent. potash).—This material contains a large proportion of sulphate of magnesia, which has by some been supposed to exercise a beneficial effect on fruit. Generally speaking, however, it can only be regarded as a low grade sulphate of potash.

Potash Manure Salt (20 per cent. potash).—This is chiefly produced from residues in the preparation of the concentrated muriate and from high-grading crude salts. It is not largely used in Canada.

As the German potash deposits represent the most interesting example of nature's fertilizer store-houses, it may not be out of place to give here a few extracts from "The Stassfurt Potash Salts."

*The Stassfurt Potash Salts, by B. Leslie Emslie, in the Journal of the Society of Chemical Industry, April 30, 1909, No. 8, Volume XXVIII.

GEOLOGY OF THE POTASH DEPOSITS IN NORTH GERMANY.

"At the time of the formation of the immense Stassfurt salt beds, wherein lie cradled the valuable potash salts, the German Fatherland presented a different appearance from that of to-day. When a great salt lake stretched itself over this land, being bounded on the west by a mighty mountain range, the remains of which we can recognize in the hills of the Rhine Valley and the mountains of Great Britain. Also to the north this lake was hemmed in by another mountain range, the remains of which we find in the mountains of Scandinavia. To the east of the salt lake stretched a wide plain, of what we must suppose was desert land, for the plains of Russia have been little disturbed by volcanic upheavals. The prevailing climate at the time of the salt-bed formations was varied. At first a decided desert climate prevailed, which practically prohibited all forms of vegetable life. Again, we find climatic conditions which favored the existence of dolium shell fish. In the south the salt lake, which stretched over the whole of present-day Germany towards a mediterranean sea, became more or less completely cut off from that sea. It is probable that an island bar, extending from the neighborhood of Geneva, over Basle, Munich, Regensburg and Passau to near Vienna, formed this sea bar and that the narrow, shallow channels, located in the neighborhoods of Geneva and Vienna, permitted the flow of the mediterranean sea into the salt lake. . . . The deposition of the salt layers took place by the evaporation of the salt water. But since the usual quantity of sodium chloride (three to four per cent.) present in sea water, would not nearly suffice to cause such a large precipitation, there must have been a constant influx of salt water during the period of evaporation. This influx of the salt solution must have been from salt-bearing springs or from the sea through a narrow channel, which had been so shallow that a backward flow of the concentrated solution was impossible. This theory of the formation of the salt deposits was brought forward as early as the middle of last century by Hugh Miller and Lyell and was further elaborated by Oehsenius in his work 'Die Bildung der Steinsalzlagern' in 1877. . . . It is probable, however, that the immense salt deposits in North Germany were formed by the influx of sea water into the salt lakes, where the potash salts were laid down. At the same time considerable quantities of salt solutions from salt-bearing rocks may also have found their way there. Considering the great variety of salts found in the potash mines, the study of the salt deposits may be looked upon as a science in itself, presenting an extensive field for investigation. . . . Carnallite and the Over-lying Layers.—The Carnallite region is a seam some twenty-five metres (about thirty yards) thick, extending over the whole salt deposits and is the particular layer in which the potash salts are mined. The average composition of the Carnallite deposits is 55 per cent. Carnallite (KCl , $MgCl_2 \cdot 6H_2O$), 26 per cent. rock salt, 17 per cent. kieserite and 2 per cent. of other substances (clay, anhydrite, boracite, etc.). . . . The Carnallite formation was interrupted by the deposition of a large salt-clay layer, some eight metres in thickness, which was partly mechanically deposited from suspended slime and partly by chemical means from the concentrated potassium chloride and magnesium chloride mother lye. In this way a cover was formed, protecting the mother lye salts from being washed out by a subsequent inundation. . . . The Present Profile of the Potash Beds. —All the salts were originally deposited in horizontal layers or with only a slight deflection from the horizontal, due to unevenness of the sea-bottom. In this position they are seldom found at the present day, being usually inclined at a considerable angle. The breaking of the earth's surface through volcanic upheavals and the contraction of the earth's crust have thrown them into every conceivable position. . . . Stassfurt a Salt Market in Mediaeval Times.—Stassfurt, the centre of the potash industry, has been noted for its saline springs from very early times and in the year 800 A.D. was, we are told, the site of an important salt market. According to tradition, the saline springs were discovered by a leader of the Wends in North Germany, who was taken prisoner by Charlemagne. At first the ownership of the springs was divided amongst the burghers of the town, there being about thirty, but in the fifteenth century the salt springs were already in the hands of a company, the members of which formed part of the Stassfurt Municipal Council. The industry was of very great importance to the locality and formed the chief means of livelihood of the inhabitants. After the commencement of the eighteenth century, through lack of improved methods of production, the industry gradually fell off and eventually, in 1797, the company sold its rights to the Prussian Government for the sum of 85,000 taler. With the introduction of new improve-

ments, including boring, the salt-mining industry was carried on by the Government into the sixties of last century. In 1851 the first two shafts were sunk with the object of mining the rock salt and in 1857 the output of salt in this form commenced. At first only the rock salt was used, but the overlying layers of impure "Abraumsalze," which presence created surprise, soon aroused the interest of scientists. When it was discovered that the "Abraumsalze," or waste salts, which were encountered in mining the rock salt contained potash, the attention of scientists was turned to these potash-bearing salt layers and very soon factories were established to manufacture potassium chloride. The "Abraumsalze," which had accumulated in large heaps near the pit heads, were soon used up. Leibig's discovery of the value of potash salts in agriculture was made in the early sixties and from that period the output has steadily increased until it has reached the present immense proportions, but by no means its limit."

In concluding this article it may be of interest to give a few figures indicating the increasing consumption of potash in agriculture. In the year 1906 the total value of potash imported to Canada was \$87,848, while during the fiscal year which ended in March, 1913, potash to the value of \$330,399 was imported for fertilizer purposes. The total output of the German potash mines [calculated in long tons of pure potash (K_2O)] was 68,580 in the year 1880; 303,610 in 1900, and 939,927 in 1911, the latter amount being equal to a production of nearly ten million tons of crude potash salts.

(To be continued.)

Get Together.

Editor "The Farmer's Advocate":

As an outsider, who has read more or less carefully the various articles in your admirable journal anent the present standing of the farmer, may I be permitted to add my own poor views? Being neither a farmer nor a political axe grinder, I may safely claim that what the said views may lack in logic, they will make up in impartiality. In the first place, it seems to me that, though farming has long since become a profession (one might almost say a science), the farmer himself seems to look upon it as nothing better than "hard work." That is, he does not insist upon his recognition as the greatest power in the land. He does not work with his neighbors for the betterment of farming generally, but competes with them, keeping prices for his products down, robbing himself and his neighbors of their just dues. This may seem a harsh criticism, but it is true. Compare the prices received by the farmer with the prices paid by the ultimate consumer and say then whether it is justified or not. The man that insists that his trade or profession be recognized and not robbed is the truest loyalist any country can have, for the prosperity of a country consists in the prosperity of its homes. The multimillionaire may have several houses and no home at all, and it does not follow that because a man has made a lot of money out of his country that he is a Simon Pure loyalist. Take an example: In your Christmas Number appeared an exceedingly able article on the Canadian cheese situation, pointing out that the middleman had practically killed the trade, from the farmer's point of view, by forcing the prices down so low that it was scarcely worth milking their cows to supply the local cheese factories. But the farmer was to blame also. Had he agreed with his neighbor on a fair price, and had both agreed not to sell milk at less, he would have got that price, and prospered. But he allowed the middleman to run wild, and the middleman also ran wild in England—for a time. Cheese began to be delivered in England unreasonably short in weight—"green" when the market was high, etc.; and New Zealand came along with honest cheese and took away most of their trade. Thus, the middleman not only killed the goose that laid the golden eggs, he killed two of them. I am not saying that the New Zealand cheese is as good as Canadian—I do not believe that it is, by any means as good, but almost automatically the fair trader got the big end, and the get-rich-quick artist got the axe.

To my mind, the whole farming question lies in the fact that the farmer does not insist on his commercial and political rights. Workingmen are forming co-operative societies; every farmer should belong to a co-operative society—it is merely being a member of a firm.

A little give-and-take leavened with as much common sense as the workingman and the farmer can possibly use will enable these co-operative societies to do great things towards lowering the cost of living. And my moral is: Get together! The middleman should be a servant, as the co-operative societies are, but I am very much afraid that we are all allowing him to become the master.

CONSTANT READER.

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