S. D. Willard warned against the excessive use of nitrogenous fertilizers for fruit crops. They are not needed. We want a healthy fruit bud, and we can get it by the free use of potash and phosphoric acid. Phosphate slag may be a good thing to supply the latter.

Much depends on the price of the article. The manufacturers in Pennsylvania used to ask $22 per ton for an article analyzing about 20 per cent. phosphoric acid. The imported slag of equal value used to cost only about $16 or $18. One member stated that the slag meal could now be had for $14 per ton.—*Cultivator.*

## PHOSPHATE OF BASIC SLAG.

Prof. G. C. Caldwell, of Cornell University, in his report on chemistry, had singled out the subject of "basic slag" for his text. He thinks it is coming to the front as an important source of phosphoric acid, which in this form is nearly as readily available as reverted phosphoric acid, which again is worth nearly as much as the soluble acid. Basic slag is a waste product of the manufacture of steel. Most of the iron ores in this country are too rich in phosphoric acid to be worked up by the old process. The phosphoric acid all goes into the slag, and some of this waste contains as much as 30 per cent of phosphoric acid. The fertiliser men cannot make use of it because it contains too much iron. Its use, however, is rapidly increasing. No trade value has as yet been placed upon phosphoric acid in slag, but Dr. Caldwell evidently thinks it ought to be rated nearly as high as the reverted, namely at seven cents a pound.

A member present also spoke in high terms of basic slag, glibly giving the whole process of manufacture, etc.; but soon, and amid great general merriment, gave himself away as a party formerly (and possible still) interested in the sale of the article. Dr. Caldwell's standing, of course, protected him against any suspicion of being in any way interested in the article otherwise than from the standpoint of an agricultural chemist, but while it was found that the article had given good results in some cases, many of the experimenting fruit-growers, among them Mr. J. H. Hale, who also had given the basic slag a trial—seemed to think that Dr. Caldwell's paper rather unduly boomed the new and little tested fertilizer. They thought that it should not be recommended in such general way until after its value has been proved by further tests. The writer is rather inclined to take Dr. Caldwell's side of the question. In his (the writer's) field experiments, in which acid phosphate and basic slag were used side by side, the results were no less wonderful and immediate from the slag than they were from the acid phosphate, and it seems quite safe to say that the phosphoric acid in slag is at least in a reasonably available form. Dr. Caldwell conceded that it was rather slow of action, and, if possible, should be applied for spring crops in the fall. It might be applied in large doses, to be drawn upon by plants, according to their needs, covering a period of years.

*R. N. Yorker.*

## WOOD ASHES.

Wood ashes are one of our most convenient and cheapest fertilisers, yet how often are they one of our most neglected, and either allowed to go to waste or bartered away to pedlars for a bar of common soap per bushel.

Our cousins across the line evidently understand the value of this fertiliser better than we do, and buy enormous quantities of what we yearly throw away as almost useless, as is shown by their agricultural papers, in one of which no less than five different firms advertise "Canadian unleached ashes for sale." As early as 1885, ashes were exported from Ontario and Quebec to the amount of $179,700.

Among the fruit-growing farms of the Eastern States the use of Canadian ashes has steadily increased; the cost is about 24c. to 25c. per bushel of 45 to 50 lbs. These prices are by the carload at Amherst and vicinity."

The prices in the Eastern States are based on a standard of 6 per cent, potash, and 1½ or 2 per cent, phosphoric acid. Fresh ashes will often exceed the above value.

In view of the above exportation and the great waste of ashes in Ontario, it is worth while for the farmers to consider whether it pays to neglect or to sell for five or ten cents per bushel in cash, or barter a bushel of ashes which the New England farmer finds worth to him 25c. per bushel by the carload.

A sample of fresh ashes from London, which were analyzed, gave:—

| | | |
|---|---|---|
| Water | 2.07 | per cent. |
| Insoluble matter | 7.65 | " |
| Potash | 7.15 | " |
| Phosphoric Acid | 1.89 | " |
| Lime | 37.33 | " |
| Magnesia | 3.02 | " |
| Iron and Alumnia | 1.53 | " |

The value of ashes lies in the amount of potash, phosphoric acid and lime which they contain. At the current price of 5c. per lb. for the first two, and ¼c. for the latter, the above sample is worth 54½c. per 100 lbs.

Leached ashes will contain from one to two per cent. of potash, the other ingredients being about the same therefore they will be worth from 20c. to 30c. per 100 lbs., according as to how thorough the leaching process has been. Coal ashes contain little or no plant food, but have a mechanical effect on some soils

Samples of ashes will vary greatly in value, owing to impurities and the care which has been taken to keep them off the earth and in a dry place: also the kind of wood from which they are obtained. Branches and top wood give an ash much richer in potash than the body wood. Ashes from soft wood are not worth as much as those from hard wood. They are usually estimated at about 4-5 the value of hard wood ashes. As a general rule, we are quite safe in putting the value of ashes at 20c. per bushel for hard wood, and one-half that amount for leached ashes.

Wood ashes are a potash (1) manure, and have a lasting influence. the good effect can generally be seen for a number of years. The gain to be derived from their use will depend upon the amount of available potash in the soil, but few of our farms are so rich in this manure but that an application of ashes would do good. They are helpful on all impoverished soils, and especially to sandy land, but their action does not depend entirely on the potash and phosphoric acid; the alkaline nature of the lime renders them very valuable to soils containing organic matter, as they act as a liberator of fertility.

Ashes which are exported are used chiefly by the gardeners and fruit growers of the New England and the Eastern States; some have found their way as far as the orange groves of Florida. Surely it will pay a farmer to keep on his farm a fertilizer which is valued so highly in other countries. Ashes are of the greatest value to plants of a woody nature, hence they furnish one of the best, as well as the cheapest manures for orchards, gardens and grape vines.

(1 And phosphoric acid manure too.—ED.

The leguminous crops, as peas, beans and clover, are much helped by a dressing, especially if they are applied in conjunction with a phosphoric manure, as bone meal. On corn, pastures and meadows, they give good results, and among the cereals they will probably give better results when applied to fall wheat than spring grain, because the season of growth is longer.

The mode of application will depend upon the crop. For fruit trees they may be applied in the fall or in the spring after the frost has left the ground, spreading evenly around the tree as far as the branches extend. For grass lands they are better applied in the spring, For fall wheat apply after the ground is prepared and before sowing. It is better to harrow the land, so as to incorporate this fertilizer with the soil before sowing the grain, for if a large amount is applied the corrosive action of the ashes might be injurious to the young plants. The quantity to apply will depend upon their freshness and strength, the particular crop, and the condition of the land. Light and impoverished soils require heavy application. Fruit trees will also require a liberal amount. For general crops apply from one-half to a ton of fresh ashes. and two or three times as much leached ashes.

*Farmer's Advocate.*

## SOILS AND MANURES SUITABLE

### FOR TOBACCO CULTURE.

### SOIL.

A soil which is deep, friable, rich, dry and warm, and one which may be easily traversed by the numerous tender fibrous roots of this plant, is advisable in this climate in order to hasten early maturity. A sheltered situation is also very desirable. Tobacco is peculiarly a farmer's crop inasmuch as there are few farms which do not afford an acre or half an acre of the above description.

### MANURES.

Analyses of the stems and leaves of tobacco reveal the fact that this plant draws heavily on the potash of the soil, so that in growing it a proper rotation of crops is desirable, and a careful return to the soil of those elements of fertility which have been withdrawn is of course necessary.

The following analyses are taken from the Report of the Massachusetts Experiment Station for 1892.

| Substance Analysed. | Nitrogen | Average. | Potash. | Average. | Phos. Acid | Average | Lime. | Magnesia. |
|---|---|---|---|---|---|---|---|---|
| Tobacco leaf | 2.75 | | 7.24 | | 1.43 | | 4.17 | 2.17 |
| Tobacco stems | 2.29 | 2.52 | 6.64 | 6.44 | .60 | .51 | 3.89 | 1.23 |

The above figures show the principal elements extracted from the soil in growing this crop, and indicate the desirability of returning them if the best results are looked for.

It should not be forgotten that the fertilizing constituents are nearly equally divided between the stalk and the leafy matter, and therefore, the utilization of the stalks for fertilizing purposes is an important feature in the economical culture of this plant. It has been estimated by Mr. Loomis of the Connecticut Experiment Station (Report for 1887), p. 84), that "the stalks contain about as much nitrogen and potash as would be furnished by an application of 70 pounds muriate of potash and 300 pounds of cotton-seed meal per acre. The latter would, however, contain nearly twice as much phosphoric acid In other words, about four tons of barn-yard manure would be needed, from which to obtain an equal amount of potash, as is contained in the stalks from an acre, but one and a half tons of barn-yard manure will furnish an equal amount of nitrogen.

It will be seen then that potash and lime are specially required, and soils in which these elements are present in large quantities produce a leaf of superior burning qualities.

Horticulturist Report for 1893.

Experimental Farm, Ottawa.

# Science.

## Are the Carbo-hydrates sources of fat in the Animal Economy, or are they solely productive of Heat and Force.

"As to the theory still supported by many physiologists, who attribute the formation of animal fats also to the saccharine and starchy matters of vegetation,—it seems to me wholly inadmissible; for from what source can the animal get the enormous quantity of heat necessary to decompose the sugar, for example, driving out eight-ninths of its oxygen and then making from it an amount of fat which will represent a sum of accumulated work, of latent heat almost double what is contained in that quantity of sugar? The animal does not have in itself this power of decomposing the water in order to store up work under the form of organic hydrogen; the plant alone can do that, by condensing the sun's heat. Electricity itself, though a powerful source of heat, cannot produce more than half of the work, for even if it could decompose the water and set the hydrogen free, it could not organize it.

Some have referred, in order to support the hypothesis of the formation of fat by means of the hydrocarbons, to the slight amount of wax produced by bees fed for a short time with sugar; without seeing that this wax originated from the protein in circulation in the bodies of the bees themselves. This production of wax is soon arrested if the experiment is prolonged; while it continues very active when proteinic material, such as the white of eggs, is added to the solution of sugar. Others have cited the slight formation of glycerine which accompanies the alcoholic fermentation of sugar; but this results simply from the vegetation of the organized ferment. In short, we see that animal fat has no other origin than the fatty element in the forages and the protein of the food, which may form about half of its weight.

To the same conclusion we are brought by the experience of all practical farmers, who have very well understood that the most favorable foods for fattening animals are those rich in protein and the fatty elements; while the foods poor in these principles have very little value for that purpose, even if rich in sugar or starch. This is proved every day with swine, which