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THE NEGLECTED SOURCE OF OUR FERTILIZERS

By STEPHEN GOLLOB, '27

Improper Disposal of Sewage Results in Great Economic Waste of Essential Plant Elements—Milwaukee Sets Example by Establishment of fertilizer plant to Handle Sewage.

MATTER is not created nor destroyed, at least so the physicists and chemists tell us. This is true, and the more precise the analysis the more evident is the truth of the above statement. The correlation of every move of nature is such that each particle of matter is accounted for. The balance of na-swings steadily, indicating the exact condition of the soil in relation to its fertility or power to produce crops, depending, of course, upon the presence of proper moisture and temperature.

We find in nature the everlasting law of the minimum; namely, the crops depends on a certain amount of the specifically required element necessary for the growth and maturity of the particular plant, other conditions being normal. Since this is a law and not a theory, we find that it is a bitter truth when applied to our soil productivity. From observations it has been learned that the essential elements for plant growth are removed by the crops. Therefore, by continuous cropping we are exhausting the necessary plant elements from the soil, with the result that our crops grow smaller each succeeding year. During the past fifteen years the Government reports have clearly indicated the diminishing yields from various sections of the country where fertilizers have not been applied.

Now, let us trace these crop incorporated elements and see where they are finally found. Take, for example, one of the most common food crops, the potato, and we find that it contains phosphorus, nitrogen, potassium, calcium, and other elements of minor importance. In removing the potato crop from the field, we remove no little amount of the above mentioned elements, and, unless we replace them, the land will, within a period of ten or fifteen years, fail to produce a crop of potatoes. But what becomes of the

matured potatoes? Usually they are consumed by human beings, either in their original form or after being manufactured into starch or other by products. And what is true of the potato is equally true of all of our food crops, the only difference being in the amount of essential elements removed.

It has already been stated that matter is neither created nor destroyed, although, in our problem, it is transformed. Only a small part of our food is actually used by the body, for in digestion we are very inefficient with the inevitable result that most of the essential elements of our food crops are found in our sewage. Here must be called the gross inattention of the American people to this utterly neglected factor of waste which could play such a vital part in our soil fertility. How are we taking care of our sewage? We let it run into a stream, a lake, a Pacific or an Atlantic ocean, or often, in Arizona, we dump it into an underground stream. Once more, is this economy? Or is it justice to our soils? Or, lastly, is this a universal spirit to leave this earth in as good or better condition than we found it? The answer to all of these questions is negative, and, since we have found our fallacy, why not remedy it by the proper disposal of the sewage, which is very essential to our food plants and, indirectly, a most important factor in our welfare.

The problem at once confronts us of a proper method of conserving and handling our sewage without harm being done directly or indirectly to those that perform the operations in putting the valuable waste where it belongs. It is an old proverb that two or more heads work better than one. Here we must call our specialists to represent the individual in untangling the perplexities which arise in sewage conservation. The so-called useless biologist must tell us if we

are dealing with useful organisms or disease producers, and how to handle each group to serve us at the end. Further, we turn to our chemist to give us the exact chemical analysis of the bulk in which these various organisms work best. Again we look to the physicist and engineer to construct the proper facilities to operate the process with the least possible effort and the lowest possible cost. Lastly, we call to our aid the economist, who can estimate the practicability of the scheme, whether or not the value of the product will be more than the cost of production.

Until fifteen years ago most of our large cities, in which a large percentage of our farm crops are consumed, have considered only the disposal of the waste without menacing the health of the general public. However, the present trend is toward the solution of a very important question—that the soil should claim the waste of animals and industries which utilize the products of the soil. The cries of the exhausted soils for organic and nutritive materials have awakened some individuals to the importance of placing the waste in such a place that it will do the most good and be of the least menace. A vivid example of the tremendous loss sustained was called to the attention of the writer when crossing the Mississippi river, which carries the waste of Minnesota, half of that of Wisconsin, the bulk of that from Chicago, and of those states through which it winds its way before the final deposits are laid down in the Gulf of Mexico below New Orleans.

Some thirteen years ago the city of Milwaukee, Wisconsin, deemed it worth while to conserve the sewage with the view of marketing fertilizers. Milwaukee is truly a pioneer in giving justice to the soil, and, moreover, is one of the few cities which considers fertilizer as national wealth.

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**THE NEGLECTED SOURCE
OF OUR FERTILIZERS**

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This is sound logic, for history shows us that stable nations have fertile soils. It would require too much space to relate every step of the Milwaukee Sewage Disposal Plant, but it is certainly one of the most modern and most practical to be found anywhere in the United States. An average of one hundred tons of fertilizer is extracted every twenty-four hours, and, with the current prices of fertilizer, this certainly means a neat sum at the end of each month. It becomes more than a mere help to defray the expense of a sanitary force, as the final product has a high intrinsic value. A crew of only fifty men operate the plant. The success of this plant is due to the genius of biologists, chemists and engineers, who labored for thirteen years before any returns were secured. But all of the citizens of Milwaukee are to be admired for the financial backing given in building the plant, the installation of which required a total outlay of thirteen million dollars.

Our often-thought rebellious neighbor, Japan, knows the value of its city waste. One may frequently hear the bargaining between the hotel keeper and the farmer, the latter furnishing one or two hotel helpers for the privilege of gathering the waste from the hotel buildings, the modern methods of sewage disposal being unknown to them, or, rather, considered impractical by them. We hardly need resort to their method of gathering the waste, but we should consider their insight of its value.

From an economical point of view, covering a period of eighty or one hundred years, we see that our soils are depleted year by year; crops are smaller and smaller. The starved soil not only calls for elements in organic forms, but for organic matter as well. Yet, at the same time,

and without the wink of an eye, we are permitting these precious plant nutrients to flow into the streams, lakes and oceans. There will be a day, and it is not far distant, when we will look for those wastes which are concentrating and polluting our waters. Is it sound economic reasoning to go to New Orleans and cart Minneapolis fertilizer when it could

be caught at St. Paul? Or, is it reasonable to let the much-needed organic material go to waste in our Arizona communities? Should we not, with our scientists at command, join and help maintain the fertility of our soil as our debt to our humble, but most honorable, farmer, upon whom the welfare and satisfaction of the nation depends?

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