NEW KNOWLEDGE OF CHEMISTRY AND SOILS

A radio talk by Dr. Henry G. Knight, Bureau of Chemistry and Soils, delivered through WRC and 39 other radio stations associated with the National Broadcasting Company, Monday, December 8, 1930.

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Good afternoon friends:

In the bureau over which it is my honor to preside, a group of scientists is working for you and producing for you results that might entitle it to be called, if not a "House of Magic," at least a "Bureau of Magic." It is the kind of magic which works for the farmers who produce crops, which serves the manufacturers who convert the farmers' products into articles of commerce, and serves the public by showing how better and cheaper products may be created.

It is our belief, in this bureau, that methods of profitably utilizing farm crops for new commercial and industrial purposes will meet the present needs of agriculture better than producing larger farm crops, and adding to the crop surpluses now faced by agriculture.

My colleagues in your service are carrying on 559 lines of chemical and physical research, but don't let that make you turn the dial for another station just yet. I assure you that I shall not catalogue in my visit to-day to your home all the research projects in the Bureau of Chemistry and Soils. I shall simply try to give you the highlights of the past year's accomplishments by the scientists of the bureau. I shall necessarily omit many worthy pieces of work.

As I look over the progress made during the past year toward better understanding of the chemistry and physics of our soils and of the products of our soils, it seems to me I should tell you about six main divisions of the work. Let me enumerate them for you now:

The soil survey which is progressing toward the goal of complete knowledge of the make-up of every bit of farming soil in the United States.

The investigations of soil erosion which we and you both hope will discover ways and means of keeping $200,000,000 worth of fertile top soil, our basic national resource, from running away to the seas every year.

The research on fertilizers which is designed to find new sources of chemical plant food in our own country and to find out how to manufacture that plant food into products most efficient for your use.

The research in soil fertility, which already is teaching us how best to use natural and commercial fertilizers and to make the countless legions of microscopic inhabitants of the soil work for us.

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The work with chemical insect pest killers, aimed to give us economical and effective ammunition for the never-ending war with these ravagers.

The work on farmcrop utilization which now and then turns up a discovery that revolutionizes our food distribution methods, or adds new sources of income to the farmer's all-too-scanty budget.

Finally, the work on such things as dyes and factory dust explosions which is aimed to serve the American industries processing farm products.

Now to backtrack and start with our soil work of the past year. I am not going to lay down the statistics, but here is one statistic that I must give you. Last year our men mapped over 20,000,000 acres of land in 27 States and territories. This brings the total agricultural land now mapped by our Bureau to 800,000,000 acres. I consider this most fundamental work. The information given by these analyses of the structure and composition of our soils is the information on which we will have to base the land classification work of the future. We are going inevitably to have to do that job — the national job of deciding which of our lands are suited to crops growing, which to grazing, and which to forest growing.

Our bureau has now surveyed and mapped andpublished the maps and findings of the surveys on the soils of more than 1,200 counties and areas in the 48 States and territories. I can't read you the list, obviously. But you can find out if your county or area has been surveyed and mapped and the results published by writing to your Congressman, or to us. If the soil survey report for your county or area has been published, and you haven't a copy, I suggest that you ask your Congressman or Senator to send you one.

You are wondering how we have progressed with the soil erosion studies, I know. I have talked with you about their importance, and so has Mr. H. H. Bennett, the man in charge of the work. Last year we located stations for soil erosion study in Oklahoma, Kansas, Missouri, Texas, and North Carolina. We want you people living in these states to visit the stations. There you will see, as the years wear along, huge tanks containing the sediment that washes off plots of typical sloping lands; you will see and be able to compare the difference between amounts of soil washing from slopes managed under different systems of cultivation, and from slopes terraced and unterraced. Many of you in Oklahoma and Texas already have visited the soil erosion stations in those States. We'll notify you in other States by radio and through the press when we start the experimental work in your States and give you a cordial invitation to visit the plots.

Now about our work with fertilizers. As I have told you before in Farm and Home Hour talks we are charged by the Congress with the duty of trying to find just as many sources of the chief chemical plant food elements in the United States as possible. The goal is complete independence with respect to the supply of these vital elements. Here in Washington out on the American University campus our chemists are still working away at the problem of taking nitrogen from the air. Their pioneer work and the work of industrial chemists resulted last year in theproduction of 100,000 tons of ammonia from atmospheric nitrogen. The work is continuing. So is the work on developing our potash resources. You

now pay $23,000,000 annually for foreign potash. We have potash mineral deposits in this country, but the chemical process of extraction and transformation into available plant food is expensive. We are making progress. Last year we produced in the United States more than 100,000 tons of potash salts with a value of $3,000,000.

Nor is this all in the fertilizer field. Our men are developing a process by which the important plant foods -- nitrogen, phosphorus, and potash -- may be effectively combined into single grains for better distribution to crops. And they also are working away at the problem of producing highly concentrated commercial fertilizers containing all of the three fertilizer elements, and the related problem of making the concentrated fertilizers in a form that will handle easily in drills.

In the realm of soil fertility we are definitely moving forward. Within the past year, for example, we conducted soil fertility experiments with sugar-beets in 7 of the 18 States where beets are widely grown. These experiments have shown the way to increasing yields two or three tons to the acre by proper use of fertilizer. Another example: in 1930 our work on prominent potato soils guided potato growers to the knowledge of the kind and amount of fertilizer for most economical production of the crop. A third example: Our experiments have shown that small applications of manganese sulphate and other heavy metals will enable the non-acid soils of the Southeastern States to grow healthy plants and produce bountiful yields of a variety of truck crops. Before we taught growers to use these plant foods many crops failed and the yields were small.

This clock hand here is revolving at breakneck speed, and I'm going to have to compress my remarks on our work on farm crop utilization into a very small amount of time. Here are some instances of the service chemistry rendered in this field last year: Our men found that milk sugar made from presently wasted sweet whey is a valuable ingredient of hard candies; that a commercially usable starch and a vinegar can be made from cull sweet potatoes; that proper salting of hides will save heavy losses annually; that oil crushed from grapefruit seeds -- now a waste at grapefruit canneries -- makes a good soap; that oil pressed from unsalable fine fragments of pecan nuts is suitable for use as a salad or a cooking oil; that turnips may be fermented into a good quality of sauerkraut. But the list lengthens too much, and I must say a word about our work on dyes and dust explosions and insecticides before I leave you.

Through the work of our chemists, the American dye industry now is independent of German sources of an important chemical, phthalic anhydride. Our engineers have developed and demonstrated an effective protection against dust explosions in factories -- the use of inert gas. As to insecticides, we have prepared new insect killers based on the chemical element fluorine, and have applied for six United States Public Service patents on these products which will be made available to the public without royalty charge. Working with the Bureau of Entomology, we recently have developed a new fumigant to protect stored wheat against insects. It is ethylene oxide and replaces the old, dangerously inflammable carbon disulphide. Mixed with carbon dioxide, the new fumigant has been successfully used to fumigate 3,000,000 bushels of wheat.

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Well, I have hit just the most elevated of the high spots in the annual report of progress of the Bureau of Chemistry and Soils. The condensed record of the year occupies 64 printed pages, and if you are especially interested I invite you to write me and ask for a copy of the report. Anyway, any of you who have pertinent questions to submit on your problems involving soils, fertilizers, and such may be assured always of a courteous answer from our men and of the best information that they can give you.

I think it is no more than right that they be courteous to you who have extended me the courtesy of listening through this dissertation.

Thank you.
