

### FERTILIZERS AND CROP PRODUCTION.

Another Discussion of the Recent Agricultural Department Bulletin—We Give Too Much Attention to Fertilizing and Too Little to Tillage.

The Progressive Farmer has already published lengthy extracts from the recently issued Farmers' Bulletin, "The Chemistry of the Soil as Related to Crop Production," and we have also published the comments of Dr. Henry Wallace; but the subject is so much importance and the bulletin so effectively rebukes the fertilizer craze from which the South has suffered so much that we are glad to reprint herewith the views of our Virginia contemporary, the Southern Planter. The following editorial appears in its November number:

"For more years than we can recall agricultural writers, scientific authorities and practical farmers have been engaged in discussion of the problems affecting crop production and the discussion still proceeds even more vigorously than ever before. With the spread of scientific education and the realization that if farming is to be made profitable it must be conducted on scientific principles, thousands who were formerly content to follow in the footsteps of their fathers find it absolutely necessary to give heed to the teachings of the expert scientists as to how and with what to feed their crops and fertilizer their lands. The difficulty they experience in doing this is to know what teaching to follow.

"In the early days when farmers first began to realize that their lands in the old country needed help, they were advised by Jethro Tull that 'cultivation was the fertilizer they needed.' Many accepted the advice and profited by it. Then investigation by scientific chemists having demonstrated that the food plants needed was nitrogen, phosphoric acid and potash in an available form, Peruvian guano to supply the nitrogen, the German potash salts to supply the potash, and superphosphate to supply the phosphoric acid, were put within the reach of farmers, and were found to give good results.

"Experience, in the use of these fertilizers has, however, demonstrated the truth that to secure continued good results their use must, when once applied, be continued, and even then their action is very uncertain. One year they give excellent returns, whilst in another year, and on the same crop, no results can be seen. On one piece of land they will tell immediately, whilst upon another their action will be inappreciable. These results led to the conclusion that what was needed was a chemical analysis of the soil in order to determine what were the plant food constituents lacking therein in order that these might be supplied.

"Experience, however, with this laboratory analysis of soils, has not given such results as to warrant confidence in its use. Too often the chemist, by means of his powerful

acid solvents, has found the soil to be well supplied with all the plant food needed, but the crop failed to make these available when only the natural solvents of the atmosphere were available. A careful consideration of all the work done in the past in advising and aiding farmers in the work of crop production and practical application of these, has led to the conclusion that other factors were at work determining the crop productive capacity of land than hitherto deemed conclusive, and with a view to endeavor to find out what these were, a great series of experiments has been conducted by the Bureau of Soils of the Department of Agriculture, under the direction of Profs. Whitney and Cameron.

"The result of these, so far as they have proceeded, has been given to the world in a bulletin just issued by the Department of Agriculture. This bulletin we regard as one of the most valuable ever published. After giving the results of the chemical examination of the natural moisture content, the true plant feeding constituent of all crops, of hundreds of samples of soil taken from typical soils in various parts of this country and abroad, the authors of the bulletin say that the analyses show that there are no wide variations in the amounts of plant food material going into solution where these various soils, so different in their other characteristics, are acted on by a definite proportion of water for a short but definite length of time; in other words, all types of soils furnish about the same amount of plant food when treated with the same proportion of water, other conditions as time, temperature, etc., being also the same.

"The conclusion seems inevitable that all our principal soil types, in fact, all cultivable soils, contain naturally a nutrient solution which varies within comparatively narrow limits with regard either to composition or concentration, and which is usually sufficient for plant growth. Apparently, therefore, all these soils are amply supplied with the necessary mineral plant foods, and these plant foods are not in themselves a matter of such paramount importance to the agriculturist, for their supply as regards the plant is determined by the supply of soil moisture which the crop can obtain from the soil.

"The chemical analysis of a soil can not in itself, therefore, throw much light upon the problem of fertility, but when attempting to control the factors governing crop yield, attention must be directed to the mechanical condition of the soil as affecting the supply of soil moisture with its dissolved mineral nutrients, to the effects of climate, to rotation, etc."

"In discussing the effect of climate on the yield of the crop—climate in this connection being understood as to its effect on the soil and temperature—the authors of the Bulletin say that 'the effect of climate is very marked, that cultivation changes the climatic conditions of

the soil; that is, it changes the relation of the soil to moisture, and probably also to temperature. It also changes the character of the atmosphere coming in contact with the root system. We know that stable manure and lime, for example, have a marked influence upon the texture of the soil, and therefore indirectly upon the climatic conditions. It seems possible that other fertilizer materials may produce effects of a similar character. If fertilizers have any influence upon the texture of the soil or upon the movement of soil moisture, they will not only influence the supply of water which will be delivered to the plant, but also the supply of nutrient materials normally contained in this water.

"The important practical inference, if this is so, is that fertilizers have, to a certain extent, the same effect as cultivation and cropping, but it is undoubtedly better to depend upon efficient methods of cultivation and cropping than to rely upon fertilizers, while at the same time neglecting to give proper attention to the physical condition of the soil. The effect due to cultivation is also more permanent than the effect due to fertilizers.

"Furthermore, the influence of fertilizers on the yield of crops is not proportional to the amount of fertilizer added, as it frequently happens that a small application is quite as efficient as a larger application. Discussing the effects of commercial fertilizers on the yield of crops, the authors remark that where the annual application of the fertilizer has been discontinued, the effect is at once apparent in the smaller yield of crops. In other words, on a soil which has a natural capacity for 13 or 15 bushels of wheat, as the Rothampstead soils in England seem to have where wheat is grown continuously and fertilizers have not been used for fifty years, the application of certain fertilizers has increased the yield to thirty bushels to the acre, but to maintain that yield a constant annual application of fertilizer has to be given and subsequent applications merely maintain, but do not increase the yield. It is recognized that in our own soils, when under intensive cultivation, as in the truck and tobacco areas, large applications of manure and fertilizers are often used amounting to from two to five car-loads of manure and 2,000 or 3,000 pounds per acre of the fertilizers; the maximum effect of these is quickly obtained, and these yields can only be maintained by continued large applications.

"The results obtained in the experiment by the Bureau of Soils go to show that these large annual applications of stable manure or of high-grade fertilizers do not apparently change permanently the chemical composition of the soil as determined by chemical analysis of the water extracts, that is to say, immediately after the application the influence of the fertilizer can be seen in the soluble salt content of the soil, but not only is this comparatively slight, but fields that have been an-

nually treated in this way for a number of years do not show on the average appreciably more water soluble plant food than adjoining soils upon which no such applications have ever been made.' The Bulletin discusses the influence of the texture of the soil of rotation, and variety of the plant, on the yield of crops and also the action and use of commercial fertilizers and their influence on the fertility of the soil. These subjects, we will take up in a subsequent article, together with the conclusions to be drawn from the experiments.

"The point we will now emphasize is, that the position we have taken up and enforced in our writing for years, that this physical and mechanical condition of a soil is of more influence and importance in the yield of the crop than the application of any fertilizer, is more than sustained by the evidence accumulated in the Bulletin."

#### Value of Spraying.

W. P. Corza, an assistant pomologist of the Department of Agriculture, devotes most of his attention to apples. Speaking of his personal experience and observation in spraying this fruit, in a conversation with the Washington correspondent of The Progressive Farmer, Mr. Corza said:

"I bought a farm some thirty years ago in Sussex County, Delaware. It had an orchard of 250 trees. I found that they were all Northern apples, quite out of place in their semi-Southern home. Thereupon I top-grafted them, but I then found that the fruit, although it set well, was every year infested with insects. The first year that the new grafts bore, I got not a single perfect apple. They commenced dropping when the size of a walnut, stung and disfigured by the larvae of the cooling moth. We tried picking up the drops two or three times a week and boiling them to kill the worms, then feeding them to the pigs. But this did not do. The entire country swarmed with the pests—my own orchard and those of all my neighbors. Not much was then known about spraying, but I fixed up a kerosene barrel, with a spraying pump and hose, at a cost of about \$5. With this I sprayed my apple trees thoroughly with paris green, and also loaned the pump to all my neighbors, as I wanted them too to get rid of the moths. I did not know anything then about combining paris green and bordeaux mixture, and thus killing the insects and fungus spores at the same spraying. We had trouble with the brown cedar rust, but overcame this largely by cutting down all the cedars around and working up a sentiment among the neighbors against them. This cedar rust works over from the cedars to the apple leaves, wintering on the cedar foliage.

"If every farmer who has even a few trees would spray them he would realize enough profit from it to more than pay for his outfit the first year, but if he has any number of trees, he is wasting money by neglecting this most important item of apple culture."