ADVANTAGES AND PROBLEMS RELATED TO THE FIELD STUDY OF SOIL DEVELOPMENT

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Field workers, principally soil surveyors, have a practical interest in studies relating to soil development which is shared by no other group. The soil surveyor in his mapping work, if he follows an intelligent mapping technic, is constantly faced with the necessity of predicting soil occurrence. Having found a given combination of soil features to which combination he gives a name, he must determine where this same combination occurs elsewhere and how extensive it is. It is impossible for him to bore a sufficient number of holes to answer the question, and he must therefore rely in part on his ability to predict where and how extensively the conditions occur. The prediction he has made is then tested by boring the number of holes which, in his judgment, is sufficient to validate his prediction.

Obviously, the correctness and, therefore, the usefulness of the map which he is making will depend not only on his skill in recognizing a given combination of soil features but also on his ability to predict correctly where this combination may occur. A prediction of soil occurrence must be based on a working hypothesis concerning the relative influence of the various soil-forming factors. The greater the surveyor's knowledge of the processes of soil development, the better his working hypotheses will be and the more useful his map should be.

The field man not only has a need for information about soil development, but he also has a unique contribution to make to pedology. As Jenny (4) has pointed out, the information obtained by a field man about soil conditions is necessarily qualitative in nature. Hence its value is restricted, and interpretations must be made very cautiously, but these qualitative observations become important because the field man can make many of them. In this way he can locate those areas where the influence of changes in one soil-forming factor can be studied while all other factors are relatively constant.

The soil surveyor is in a position to discover many of the weaknesses of our present concepts relating to soil development which we know to be based on limited data, and therefore incomplete and imperfect. As new data are accumulated, our present theories will be in need of modification, or they may have to be discarded altogether when they fail to explain new data. The surveyor is constantly faced with soil differences which can be observed qualitatively, and most surveyors know from experience that many of the soil differences which are observed cannot readily be explained by current concepts of soil development. Because it happens so often that facts fail to fit our theories, there is a tendency to overlook or finally to forget the unexplained variations. In some cases, to show the variations, the surveyor sets up a new Series which is later quietly eliminated because the area is small, while the major problem, the recognition and solution of which would add to our knowledge of soil development, is too often overlooked. If the problem is recognized, it often is not brought to the attention of laboratory workers who may be looking for just such conditions.

Not all soil surveyors are competent to interpret soil development or even to make intelligent field observations. To make the best contribution, the men must know and appreciate the natural laws as expressed in chemical and physical-chemical reactions, must be thoroughly trained in geology and pedology, and must have had a wide experience with soils in the field.

Caution must be exercised in drawing conclusions based on an observation at variance with current theories of soil development, for if the conclusions are based on limited field or laboratory observations, they need to be tested over a wide geographic range. When the observer is not himself in a position to make such tests, he should not be hesitant about publishing tentative conclusions, for after his conclusions have been published soils men in other areas are in a position to test them.

In contrast to the field man, the laboratory worker studying soil development is able to make quantitative observations, but he works under the handicap that processes in which he is interested progress so slowly that they are difficult to study in the laboratory. Mature soils have not yet been reproduced in the laboratory. Hence the laboratory worker must ordinarily content himself with the determination of what...