

AIMS AND OBJECTS OF SOIL SURVEYS

(a) Soil Surveys in General

Development of land resources has too often in the past been left entirely to trial and error methods. This has led to improper land utilization and a deterioration of land resources. In places where attempts are being made to modernise agriculture through the adoption of scientific practices past errors can be corrected, and further errors avoided, through soil surveys for land use classification. What then is a soil survey?

Pendleton (1926) defines it as "an attempt to point out and classify soil differences and similarities in order that the soils may be handled and fertilized as intelligently as possible." He discusses Geological and chemical soil surveys. The defects of these and economic considerations led the Bureau of Soils of U.S. Department of Agriculture to evolve the modern method of soil surveying. This embodies all soil properties which considered will foster a form of land use to man's greatest advantage. These criteria when considered together often give a close index to the crop producing power, the fertility status, the fertilizer needs and the ecological optima of a given soil in respect of a given crop.

Baeyens (1949) expounds a typical modern concept in a paper on the classification of tropical soils in relation to their agricultural value. He observes that "such a classification must (a) be genetic and totalitarian, i.e. it must consider all the factors of soil formation, and (b) must have a dynamic character, i.e. must be based on the interaction of the pedogenic factors in the profile. Thus the study of the profile stands at the very centre of all modern soil classification, since the profile constitutes the image and the actual crystallization of the pedogenic factors which have been at work". In emphasizing the importance of horizon thickness and humus infiltration, he introduces the concept of a "pedological fertility scale", i.e. the

ability of a given soil to carry a given crop and produce a given yield subject to its pedological characteristics. This concept is the tool of a particularist or practical pedologist in all soil surveys.

Baeyens next lists factors which limit crop performance. These included the following:

(i) Climate: Soil and air temperatures affect crop growth. Annual rainfall, rainfall distribution and reliability affect soil characters, its agricultural properties and crop performance.

(ii) Profile Morphology: especially the homogeneity and heterogeneity of profile. If the climate is good and the profile is free from "accidents of profile" as stoniness, concretionary iron stone, sandy layer between two clay layers, a gleyed layer due to high water table, the soil remains suspect despite its other virtues.

(iii) Texture and Structure: These have been much emphasized in any soil survey work and methods for their systematic study have been developed (cf. Clark 1956, U.S.D.A. Soil Survey Manual 1952).

(iv) Moisture Retention: The soil must retain a maximum of capillary water especially in the dry season, while allowing maximum drainage for efficient aeration during the rains. This property is conditioned by texture and structure and affected by ground water and meteorological water.

(v) Organic matter: This acts as water reservoir and promotes good structure.

(vi) Chemical Character: This is regarded as the least important. In the tropics a soil under a favourable climate and possessing optimum physical and hydrological characteristics is fertile, even when its percentage content of nutritive material is low. "This apparent paradox is explained by the role of temperature and rainfall in liberating even in a poor soil a nutritive capital sufficient to produce the most exacting crop."

The discussion on cacao cultivation (page) shows the varying degrees to which the soil types found in the settlement satisfy or fail to satisfy these requirements of a good soil.