INTRODUCTION.

The possibility of soil analysis by some measurements of plant growth must always be an attractive one on account of its simplicity, and improvements in the technique of chemical methods of analysis have not lessened its appeal. The technique of chemical analysis, applied as a routine method, is indeed not yet infallible, as is shown by the failure of the Truog test for phosphates in highly alkaline soils, and the somewhat lengthy procedure required in determinations of available potash. Particularly therefore, in places where the facilities for chemical analysis are lacking, some direct method of assessing the nutrient status of the soil, by plant response, which requires less time and expense than a field experiment, would be of the greatest value.

Previous to the work of Professor E.A. Mitscherlich most of the attempts to explain the response of a plant to the application of manurial elements were based on Liebig's "Law of the Minimum". This law stated that the growth of a plant was governed by the manurial constituent which was most deficient in the soil, and that no increase in growth could be expected unless this constituent was increased.

Mitscherlich however, as a result of numerous experiments, advanced the theory that any manurial factor which affects healthy plant growth, exerts its effect independently of any other factors, although the absolute effect upon the plant will depend upon the intensity of all the other factors capable of exerting any influence.

As a result of pot culture experiments, Mitscherlich proved that increases in plant growth, measured by the dry matter content, bore a mathematical relationship to increased amounts of

any one manurial factor. These increases in yield were not directly proportional, but could be represented by logarithmic curves of diminishing response up to the point where the maximum growth of that particular factor was obtained. This mathematical relationship was said to be constant for any conditions of growth.

Once the exact form of the relationship between the weight of plant material and the manurial constituent in the soil was established, it became possible, by growing a suitable indicator plant under controlled conditions, to discover the quantity of known manurial constituents in the soil. This technique has therefore been used as a method of soil analysis for the manurial elements, Nitrogen, Phosphate, and Potash.

Although the theories put forward by Mitscherlich have been severely criticised in certain quarters, the methods of soil analysis which are based upon them have met with considerable practical success, and are employed on a commercial scale in Germany. In Scotland, and in Hawaii under tropical conditions, these methods are also being investigated. At the Imperial College of Tropical Agriculture the practical possibilities of applying the Mitscherlich pot technique under local conditions have been under examination for the past three years, and the following paper contains a brief review of this work, and an account of this season's experiments.