

INTRODUCTION.

The soil of the College Farm is a light silty to sandy loam, having a varying proportion of gravelly particles, and it is in general of low fertility. One of its characteristics is a tendency towards acidity, and so whenever a new field has been acquired for the Farm and brought under cultivation it has been limed. From time to time certain of the fields have been re-limed, but the practice has been to apply large dressings at long intervals, rather than small dressings at frequent intervals. In most cases the quantities applied have been in excess of the theoretical "lime requirement" of the fields. It may be said that, on the whole, the response to liming has been disappointing.

Owing, perhaps, to the fact that limestone of good quality can be obtained easily and cheaply in Trinidad, liming is among the common local agricultural practices. It has been recommended for use in vegetable gardening (1), especially on heavy soils. The physical effect of lime on heavy soils is often to make the soil particles less sticky and more crumbly and the soil easier to work; this is expressed in the saying of Trinidadian gardeners that "lime makes the dirt (soil) more loosey". On many of the sugar cane soils of Trinidad liming is one of the routine estate practices; root rots of cane in Trinidad, similar to those reported from Hawaii (2), and thought to be associated with aluminium toxicity, have been cured by liming; and the liability of cane to attack by the sugar cane froghopper and its ability to recover from attack have been shown to be dependent on soil conditions and fertility, with special reference to lime status (3).

In 1931 a manurial experiment was begun on one of the

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fields of the College Farm with the object of ascertaining the chief nutrient deficiencies and responses to manuring of the College Farm soil. Sixteen plots were used in the experiment including one control plot which received no manure throughout the experiment. Each of the remaining fifteen plots received one or more of the following manures, alone, or in combination: sulphate of ammonia; superphosphate; sulphate of potash; organic manure (pen manure or compost); lime. Each plot received an identical manurial treatment year after year, for seven years. The layout of the experiment did not conform to modern statistical requirements, but the accumulated data of seven years were analysed and the results have been published(4). The organic and artificial manures were applied to the appropriate plots for every crop. Lime was applied once only, at the beginning of the experiment, at the rate of ten tons per acre. Since the experimental treatments included lime alone and lime in all combinations with organic and artificial manures, it was possible to assess the effects of lime on College Farm soil under varying conditions. The soil reaction at the beginning of the experiment was acidic (pH 6.2) but the application of lime created highly alkaline conditions (pH 8.1). Liming, however, gave disappointing results and crop yield data did not show any appreciable increase in production that could be attributed to liming. The dressing of lime applied in this experiment, judged by the theoretical lime requirement for the particular pH and the type of soil, was nearly three times too large. And in fact the data indicate that lime exerted harmful effects during the first two years of the experiment but that these harmful effects diminished in time.

One of the undesirable effects of heavy lime dressings may be to fix phosphates in such a form that they become unavailable to plants. This effect is usually temporary, and the phosphate status of the soil may improve after a few years (5). A suspected
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case of phosphate fixation in a field about half a mile from the College Farm was investigated by Smith (6) after it had been found that very large dressings of superphosphate (up to 20 cwts per acre) were necessary before any response was apparent in the growth of cotton. As a result of this investigation it appeared that a fairly heavy dressing of limestone (5 tons per acre), applied immediately before the superphosphate, had had the effect of rendering much of the phosphate unavailable, by the formation of unavailable calcium phosphate. This is not an uncommon effect and means that lime may cause a temporary decrease in crop growth on certain types of acid soils if it is applied immediately before planting; after equilibrium is established, however, and free calcium carbonate is no longer present, there may be an increase in available phosphate and crop growth may subsequently be improved. Such an effect of liming, however, would not be likely to occur on any of the College Farm fields because none of them is more than slightly acidic in reaction, and all have been limed within the last twelve years.

It was with the idea of investigating further the immediate effect of lime on crops grown on College Farm soils that an experiment was initiated in Field I on the College Farm in 1939.