A superficial examination of a soil by the experienced agriculturist is generally sufficient to indicate to him its value, and, except with regard to the above points, for ascertaining which chemical analysis is necessary, the practical judgment founded on the inspection of its mechanical properties, and comparison with other soils of known quality, is usually sufficient for ordinary purposes.

However perfect a soil might be from a chemical point of view, all its best properties may be overruled by mechanical defects, such as want of percolation, want of drainage, the presence of charcoal in the soil, which competes as an absorbing agent with the roots of plants, and many other apparently slight and unimportant causes which are quite sufficient to arrest the growth of plants, notwithstanding that every element they require may be present in due proportion. In such cases the information which a chemist supplies is principally useful from its giving an assurance to the farmer that if the mechanical defects be removed, what may appear to him to be a barren and worthless soil may yet be susceptible of a high state of culture.

From a general examination of the table attached to this report, more particularly of columns 17 to 23, which give the composition of portions of the soil soluble in weak acid, and therefore most amenable to atmospheric solvents, it will be seen that not one of these soils is quite deficient in the common mineral ingredients which are essential portions of vegetable tissues.

No. 3.—Taking, for instance, a soil from the North Shore of Auckland, which contains the least proportion of the soluble mineral elements required for the nutrition of plants, and therefore as being a case where such specific addition would certainly be required if in any, and calculating from the reliable data, founded on experiment which is supplied in Liebig and Johnson's agricultural works, we find the following results:—

Soil No. 3 from North Shore, Auckland.

Centesimal proportion of Substance soluble in Acid.		Acreage yield in a depth of six inches, the specific gravity being assumed at 2·5.	Equivalent to the following average Crops.
Phosphoric Acid	·020	675 lbs.	Three wheat crops, corn and straw.
Potash	·019	641 „	Fourteen ditto
Lime	·080	2,696 „	Twenty-two turnip crops, bulb and tops, at twenty-two tons per acre.

Or, taking four years' rotation of crop—for instance, turnips, barley, clover and rye grass, and wheat—a sufficiency of phosphoric acid has been thus easily liberated for six such rotations; of potash for two; of soda for seven; of magnesia for twenty-four; and of lime for fourteen; in such rotation average crops being always supposed.

The only marked deficiency in this soil is therefore in the proportion of potash present, and this is the particular mineral food most likely to be first exhausted in a system of general cropping.

It will be borne in mind, these average quantities of the several food elements is by no means the absolute quantity in which they exist in the soil, but the proportion only liberated in a short time by the action of weak acid, the great bulk of the soil, or about 95·4 per cent., remaining intact, and containing a large reserve of the same elements ready for liberation by more prolonged exposure to disintegrating agents, for it will be noticed the great part of the base of this soil is basaltic, and consequently rich in alkalies, magnesia, and lime.

On the whole, therefore, it may be safely affirmed from these calculations, that so far as their chemical composition or amenability to common disintegrating agents is concerned, there is no reason to expect that any of these soils may not be advantageously cropped with any plants suited to the climate.

This is somewhat opposed to certain current opinions on this subject, as from the insufficiency, unfrequency, and limited area of calcareous deposits in some parts of the Colony, a scarcity of lime has been anticipated in some of these soils, particularly those from the Waikato basin. True carbonate of lime has been met with in large proportions only in one case, viz., No. 7, an Oamaru soil, obtained from the vicinity of a limestone country; but, at the same time, other lime minerals have been found of general occurrence. Thus augite, a mineral associated with igneous rocks, containing no less than 15 to 25 per cent. of lime, is found generally among those soils taken from the Waikato basin, and will be found to yield a sufficiency of that ingredient by the decomposition of the drifts derived from the augitic lavas.

So far, indeed, from the analyses having exposed any poverty in the constitution of the soils, the quantity of alkaline matter present in a state of feeble chemical combination, is in a few of them very remarkable: thus No. 4, from Oamaru, No. 10, from Rangitikei, and Nos. 11, 14, 15, 16, 17, from Waikato, give from ·900 to 2·430 of alkalies, and it cannot be doubted that there is in all these soils an abundance of mineral food for all the varied wants of ordinary farm produce, and in a form very favourable to the proper effect of food-preparing agents. It follows, therefore, that any infertility which may practically be found to characterize any of them, will be due to other causes than their chemical constition. Of these causes the principal one is the want of drainage, which is required not only for the purpose of removing surface water, but also to promote the circulation of atmospheric agencies in the soil. The large tracts of clay land in the northern districts of the Colony, characterized by a worthless growth of Manuka scrub, are barren solely on account of their defective mechanical properties in this respect. Such land will be improved by continual culture, and will probably not acquire its full value till after the volcanic soils in the same district are comparatively exhausted.