

FRIDAY, 13TH SEPTEMBER, 1912.

BARNARD CRACROFT ASTON sworn and examined. (No. 15.)

1. *Hon. Sir J. Findlay.*] What is your profession?—Government Agricultural Chemist.

2. Will you make a statement?—I have prepared a short statement on the lines of the statement I made last year. Since I had the honour to give evidence on the pumice soils before the Committee of last year the field experiments which then had only been instituted a few months have yielded results which emphasize the truth of several statements then made as to the manurial treatment likely to prove most advantageous to the farmer of pumice soils. For the most part these experiments have been conducted on lands which originally supported a dense forest, but are now laid down in grass. One series of experiments was, however, instituted at Lichfield on an area which originally was covered with scrub. The results on both types of country—forest and scrub land—have been substantially the same, and go to prove that a good top-dressing of phosphatic fertilizer has a great ameliorative effect, increasing both the feeding-quality and the quantity of the pasture. It is thus satisfactory to be able to substantiate the opinions I expressed last year—opinions which were formed from laboratory experiments—with evidence derived from field experiments and actual farming practice. “Improvements in pumice soils must depend largely on increasing the store of humus and by application of phosphatic fertilizers. There is some evidence that superphosphate is the most suitable phosphate to apply. I attach great importance to the need of increasing the content of humus on pumice lands not only because it will improve the mechanical condition of the soil, but because a very great increase in the availability of the plant-food may therefore be effected. There is not wanting evidence that pumice soils are capable of very great improvement.” Basic slag has proved the most successful form in which to apply phosphate, judged by the effect produced on the quantity alone of pasture produced, although the beneficial results of slag were slower in making their appearance than was the case of those of superphosphate. This was only what was to be predicted from theory, as analyses showed that the soils experimented with were very deficient in available phosphoric acid, which was so low indeed that no figure was employed to represent the amount present, the result being stated as “traces” merely. On the other hand, potash, which is the dominant fertilizer ingredient required by clovers, was found to be present in good quantity, and the application of potash manure where it was in one instance tried was without any observable effect—again bearing out the value of chemical analyses. Additional evidence has been acquired bearing out the previously expressed opinion that an increase in the humus content of the soil would, other things being equal, result in much better returns. The cheapest way to supplement the humus will probably be to stimulate the growth of clovers by application of phosphates. In order to obtain positive results in our experiments, which were undertaken not so much to find out the increase in yield of pasture as to find out the increase in feeding-quality, it was necessary to give a maximum dose of top-dressing—in fact, to make sure of overdoing it in order to get a positive result. I am not, therefore, in a position to speak with certainty as to the most economical quantity of fertilizer to apply. From the experience of farmers in the same district it can, however, be predicted that a comparatively small dressing, a few hundredweight merely, will prove successful. All the elements of fertility save one are present in the pumice, but they are mostly in an unavailable state. The exception is, of course, nitrogen, which can be obtained from the atmosphere through the agency of bacteria to be encouraged by appropriate methods of farming.

3. One of the ingredients you mention is what?—Nitrogen, which can be secreted by those bacteria which feed on clovers and other legumes.

4. Is your present statement supplementary to your statement of last year?—Yes. It includes the results of experiments made during the past year.

5. We can take this statement of last year as read and as part of your evidence this year?—Yes. There is one statement made last year about lime—“To effectively establish lucerne may require dressing with lime, and this entails railage facilities from Te Kuiti.” Our experiments so far go to prove that lime is rather injurious on pumice soils, but with that correction I think that matter can be left there.

6. *Mr. Buchanan.*] You said just now that all the elements of fertility were present in the pumice soil?—In the pumice soil as it comes out of the earth; all the elements are there if they could only be weathered down.

7. Except phosphoric acid?—It is deficient, but it is there.

8. The evidence of a scientific man like yourself to a certain extent is technical, and what we wish is to understand what you desire to convey to us?—Yes.

9. As I attempted to follow you I understood you to convey that phosphoric acid was so scarce that no figure was employed to represent the amount?—I think I said “available” phosphoric acid.

10. Then by the application of basic slag the phosphoric acid at present unavailable becomes more available?—Yes, because basic slag stimulates the clovers and the clovers make humus, and the humus acts on the decomposed rock to further decompose it.

11. These soils have been covered by vegetation of some sort, sometimes bush and sometimes scrub and fern, and so on?—Sometimes by moss and lichen.

12. For generations?—Yes.

13. And I suppose, in the ordinary course of events, failing fern—and even with fern the quantity of humus is gradually increasing: is that so?—Very slowly, because there were no clovers indigenous to New Zealand. New Zealand is singularly free from indigenous leguminous plants.

14. In my part of the country the decaying fern-leaves accumulate a lot of humus, which is on the surface: would not the same accumulation take place on pumice soil?—No. Unfortu-