

nately, the fern will grow 6 ft. to 10 ft., and humus is not left on the surface. It is in the root, going into a vertical layer, not a horizontal layer.

15. Taking 4 in. or 5 in. of surface soil, would there not be a lot of humus in that decaying vegetable matter?—I do not think there would be.

16. To make myself clear, I want to mention what came under my notice in pumice soil: Up at Karioi, on the Main Trunk line, I had a look at a crop of potatoes. The bush was burnt, and a crop of potatoes put in—a splendid crop. Immediately alongside was a crop of oats on land which had carried potatoes the year before. The crop of oats was a miserable one. Further out the English grasses had died out where clearings had been made. The furthest-out part of the clearing, which had been made years before, showed not a vestige of English grass at all—nothing but flat Capeweed. Now, can you give us any lesson from the appearances I have described?—In the bush soil the potatoes did well?

17. It was a splendid crop?—And outside they did not?

18. No; the crop of oats had carried potatoes?—You are comparing a crop of potatoes with a crop of oats, and they cannot be compared—they are entirely dissimilar.

19. I quite understand that; but I wanted your opinion as to whether or not that crop of potatoes had not taken most of the more valuable constituent present in the soil to such an extent as to starve the crop of oats?—No. I think the reason is this: the potatoes require humus more than oats do; therefore, on a soil which contained more humus they benefited very much. The oats growing outside was not a good crop?

20. No, a poor crop—starved. The oats were growing upon last year's patch of potatoes—the oats succeeded potatoes?—I do not quite see the point you are trying to make.

21. I am trying to get something from your superior chemical knowledge?—Yes.

22. We have had evidence as to the great effect of a certain amount of manure—basic slag or phosphate—upon this pumice soil: would you expect the same good effect after some years of cultivation as in the beginning when treated as new soil, so to speak?—Certainly you would expect a better effect after some years of cultivation. You would have a crop, and to have a crop you would have manure, and that would be improving the land. Every crop would improve the land.

23. Supposing, for instance, there was some ingredient in the virgin soil on which the basic slag or phosphate had an important chemical effect, and supposing the supply of humus had considerably increased: would you then expect the same effect from the application of manure as in the case of the first application to virgin soil?—Well, if the supply of phosphate had decreased I would not.

24. Even if the humus had decreased?—No, I would not.

25. To put it in a general way, my difficulty has been whether the application of manure in future years would be as successful as we would suppose it has been as applied to virgin soil?—I think those soils will improve the more you cultivate them.

26. I have not got the answer I wanted. I have understood you to say that the success of an application of manure was largely due to the action of the manure on the humus?—The action upon the clovers.

27. The humus present in the virgin soil by the application of manure gives the good results: would you expect the same good results in later years if the accumulated humus in the virgin soil had lessened?—It depends upon how much it lessened.

28. Let me put it in another way: In medical practice, as we understand it, the application of stimulants of any description after a little time is weakened in its effects?—Yes.

29. In other words, as applied to this case, would that be likely to happen in future years in regard to manure?—No, I do not think so. It has been proved that if you have given a good dressing of slag to the land you can by another good dressing of slag still get beneficial results.

30. Would you expect that to continue in future years?—Yes.

31. *Hon. Dr. Pomare.*] Where did you make your experiments? At five farms scattered around Rotorua. The one farthest from Rotorua was Lichfield; there were three at Mamaku, and one at Te Pu.

32. Those were all bush lands?—All except Lichfield: that was scrub land.

33. Does the experiment carried out on the bush lands really apply to this part of the country?—No, but they bear out the experiments carried out on the scrub land. They were substantially the same.

34. How much basic slag do you say it would require per acre to manure this land effectively?—I said the amount of basic slag which we could recommend economically we could not state now from our experiments, because we have overdone it. We have to obtain a positive result, and to do that we have to put on a large dressing—half a ton to the acre.

35. How much would that cost?—It is £3 15s. a ton free on rail at Auckland.

36. How long will the effects of basic slag last?—Some of the effects will, of course, last for ever.

37. So that you would not have to manure again?—I should say it would be at least seven years, and possibly longer, before you would have to manure with basic slag again.

38. So that in twenty-one years the value of the manure would be over £5 an acre?—Yes, about that in slag.

39. When you carried out the experiments at Lichfield, what sort of scrub was it—tall manuka?—It is tauhinu (*Pomadrovis phyllicifolia*) and short manuka (*Leptospermum scoparium*).

40. *Mr. MacDonald.*] Did the experiments at Mamaku, Te Pu, and Lichfield give about the same results?—The same results according to the supply of phosphates.