1903.

NEW ZEALAND.

JOINT AGRICULTURAL, PASTORAL, AND STOCK COMMITTEE:

REPORT ON THE ORCHARD AND GARDEN PESTS BILL, TOGETHER WITH MINUTES OF EVIDENCE AND APPENDIX.

(Hon. J. D. ORMOND, Chairman.)

Report brought up on Friday, 11th September, 1903, and ordered to lie on the Table. Evidence and Appendix brought up on Tuesday, the 13th October, 1903, and ordered to be printed.

ORDERS OF REFERENCE.

Extract from the Journals of the Legislative Council.

Thursday, the 2nd Day of July, 1903.

Ordered, "That Standing Order No. 162 be suspended, and that a Select Committee be appointed to consider all matters pertaining to agricultural and pastoral industries and stock, with power to sit and confer with any similar Committee that may be appointed by the House of Representatives, and to agree to a joint or separate report; with power to call for persons, papers, and records: the Committee to consist of the Hon. Mr. Baldey, the Hon. Mr. Bowen, the Hon. Major Harris, the Hon. Mr. T. Kelly, the Hon. Mr. W. Kelly, the Hon Mr. McLean, the Hon. Mr. Ormond, the Hon. Mr. A. L. Smith, the Hon. Mr. L. Walker, and the mover."—(Hon. Mr. Pitt.)

Extracts from the Journals of the House of Representatives.

Friday, the 3rd Day of July, 1903.

Ordered, "That Standing Order No. 211 be suspended, and that a Committee consisting of twelve members be appointed to consider all matters pertaining to agricultural and pastoral industries and stock, with power to confer and sit together with any similar Committee which may be appointed by the Legislative Council, and to agree to a joint or separate report; the Committee to have power to call for persons, papers, and records; three to be a quorum: the Committee to consist of Mr. Buddo, Mr. Hogg, Mr. Kidd, Mr. Lawry, Mr. Lethbridge, Mr. Massey, Mr. T. Mackenzie, Mr. Rhodes, Mr. Rutherford, Hon. Sir W. J. Steward, Mr. Symes, and the mover."—(Hon. Mr. Duncan.)

Friday, the 31st Day of July, 1903.

Ordered, "That the names of Mr. Bollard and Mr. McLachlan be added to the Agricultural, Pastoral, and Stock Committee."—(Hon. Mr. Duncan.)

Tuesday, the 28th Day of July, 1903.

Ordered, "That the Orchard and Garden Pests Bill be referred to the Agricultural, Pastoral, and Stock Committee."—(Hon. Mr. Duncan.)

REPORT.

ORCHARD AND GARDEN PESTS BILL.

THE Joint Agricultural, Pastoral, and Stock Committee, to whom was referred the Orchard and Garden Pests Bill, have the honour to report that they have carefully considered the said Bill, and they recommend that it be allowed to proceed, with the amendments shown in the copy attached hereto.

J. D. ORMOND,
Chairman.

11th September, 1903.

MINUTES OF EVIDENCE.

FRIDAY, 7TH AUGUST, 1903.

T. W. KIRK, F.L.S., examined. (No. 1.)

1. *Hon. Mr. Pitt.*] Do you consider that this Otahuhu Orchard is an object-lesson that the codlin-moth can be successfully coped with by the Department or by any one who understands the process recommended by the Department?—Yes, certainly.

2. And as regards the cost of working the orchard by the Department, which has to pay for all labour and so forth, how would it compare with the expenses of the settler, who has his family to assist him, and who understands the methods recommended by the Department?—Probably the cost would be twice as much to the Department.

3. Would it not be better for an old orchard to be trimmed back—would it not be better to trim all the trees together?—That would depend upon the condition of the trees. It may be better to prune back, or to prune sharply back.

4. *Mr. Buddo.*] Will you state, Mr. Kirk, whether, in your opinion, a younger orchard—I mean trees that are not so old as eighteen years—could be more successfully dealt with?—Undoubtedly it could.

5. Would the fact of this orchard being so very old militate against successful results?—Yes; old and neglected orchards are more difficult to deal with.

6. What is the Department's opinion as to the age an orchard should be kept without replanting?—Well, that is a question I cannot answer. It depends so much upon the local conditions and on the treatment it has received, and, of course, on the varieties of trees you are dealing with.

7. Is there any export of fruit from the Province of Auckland?—No; not export from Auckland.

8. Outside the colony?—No; practically none.

9. Is there any export from any other part of the colony to places outside of it?—Usually. In this report [produced] the figures are set out for each port. The amount of exports from the colony are as follows: Auckland, 1902, £103; Wellington, 1898, £136; Christchurch, 1898, £1,664, and in 1899, £950, 1900, £1,052. I reckoned there was practically no export from the colony last year.

10. Are you of opinion that a canning industry would be of assistance to the settlers in the colony?—Most decidedly; I have been urging that for some years past.

11. With your experience, are you of opinion that the industry would be taken up by any considerable number of settlers if it was found to be successful—that is to say, that trees could be grown free of insect life, and that there was established a market for them? Is the feeling on the part of the settler strong enough to take up fruit-growing if the orchards can be kept free from insect life?—Decidedly so.

12. Is the codlin-moth troublesome in other parts of the colony besides Auckland?—Yes; Nelson comes next of the worst places.

13. In any other places—in Otago Central, for instance?—It is scattered. They are not much afraid of it in Otago Central.

14. Why does the Department recommend arseniate of lead as against arsenic and soda?—We recommend it because of its facility of application, there also being no risk of scorching.

15. Is it a fluid preparation?—Yes, and put on by the spray-pump.

16. Does the settler obtain it as a fluid preparation?—He can get it as a powder, but he usually obtains it as a fluid preparation.

17. *Mr. Massey.*] I think, Mr. Kirk, that you expressed the opinion that this orchard was an object-lesson to the fruit-growers in the colony: how can it be an object-lesson when it has proved not to be a commercial success?—I would just like to repeat this statement: that the orchard was taken over with the primary object of showing that the codlin-moth could be controlled. The Auckland people said it was impossible to control the moth, and they considered that orchard was the worst that could be given to us in the district. If you were wanting a "commercial success," we should have severely pruned; there would have been no fruit for two years, and we should have been doing no spraying for moth for two years, but should have freed the orchard from the moth because there would have been nothing for the grubs to feed on for that period. The whole object of this orchard was to show the efficacy of spraying and proper treatment.

18. Have you got the receipts and expenditure in connection with this orchard?—They are in Auckland. I can get them if they are required.

19. Did it not strike you that the Committee would require them?—No; it did not occur to me.

20. I understood you to say in answer to the Hon. Mr. Pitt that this orchard cost the Department twice as much as it would cost the private individual: would you explain that?—I said probably twice as much. In the first place, if you are attending to your own orchard you are on the spot yourself. You have got your own horses, and your own farm implements, and the assistance of your family. Now, we have to hire all that, and we had to depend upon a man engaged for the day.

21. Did you not have a man in charge of this orchard?—Not resident there. It was not large enough to engage a man permanently there.

22. Is it not a fact that, so far as Auckland is concerned, the moth is disappearing—is gradually becoming less?—Well, name a special district.

23. Take the Auckland District as a whole?—No; it is not so—the province as a whole.

24. Would you be surprised to know that it is the general opinion of the Auckland fruit-growers that the moth is going?—I should be surprised if their hopes were realised.

25. Well it is so?—It is my opinion that in the Auckland Province as a whole the moth is as plentiful as ever.

26. What districts have you visited?—All over.

27. Waikumete?—Yes; and the officers have been all over it.

28. And you think the moth is as plentiful as ever?—Taking it altogether, Yes. I do not think there is any reduction in the moth. The moth varies so much according to the season. If it is a very wet season the moth is not so bad. Its prevalence varies according to the season.

29. With regard to the Otahuhu Orchard, do you know the age of the trees when they were taken over by the Department?—No, I do not; but I understand fifteen or sixteen years old.

30. And therefore they ought to be just about in full bearing at that time?—They ought to be if looked after.

31. How long has the orchard been abandoned?—Some years. I do not know exactly.

32. You are not able to give us an estimate of the actual cost of spraying operations?—Yes; you have the actual cost of spraying stated in the memorandum read and in last year's report.

33. You have not made it quite clear: when you say 10s. 8½d. per acre, is that per acre per season, or is it only the cost for this particular article?—For this particular article per application.

34. Perhaps the cost of the spraying would probably amount to £2 per acre?—That would depend upon the condition of your orchard.

35. Would it average 10s. per acre each time?—If you had a whole acre of that kind to do, under the same conditions.

36. Do you know, as far as the moth is concerned, that it may now be found in other trees besides fruit-trees—in the karaka berry?—No.

37. You have not seen it in any other native fruits?—No.

38. Are you certain?—I say I have never seen it. I should like to see specimens.

39. Nothing of the sort has been reported to you?—I have seen it reported in the newspapers, but have never yet been able to get any one to send me a specimen.

40. *Mr. Rhodes.*] Have you any knowledge of how long these trees remained unpruned before the Government took them over?—I do not know. Some were 20 ft. and 25 ft. high; very neglected and misshapen.

41. *Mr. Massey.*] Are you aware that the owner of the orchard, instead of spraying with the ordinary instrument, sprayed with the strawsonizer?—I know that; but it is not suitable, and is too expensive.

42. *Mr. Rhodes.*] Have you any evidence as to the size of the apples before the Government took them over?—I cannot say. I was informed that they got a total of about £15 for their crop. I would not like to state that positively. The people who bought the crops before we took it over refused to buy our first crop as they had lost so much previously.

43. How many acres would you say there are?—Between two and three acres.

44. After the Government took over the orchard were they getting a good price?—Oh, yes. In fact, we were getting such a very much better price for the fruit in Wellington that we were sending it down here. The price in Auckland is, I understand, regulated by an association of buyers. The producers have no such association.

45. The fruit is ripe sooner in Auckland than it is in the South, is it not?—Yes.

46. Do you think that Mr. Lippiatt considered that it was more profitable to root out these old trees and plant new ones rather than to take old ones in hand?—I understand that he had commenced to root up the old ones, but not to plant new ones. I understand the present owner of the orchard is remarkably pleased with the results.

47. You consider that these were good varieties to experiment with?—Yes; they were very fair varieties as grown in Auckland.

48. I do not mean so much as regards the codlin-moth, but as regards other blights?—Oh, yes.

49. You cultivated the land: did you apply manure?—Not yet. The trees received no help, except cultivation on one part of the orchard. We are going to apply it now.

50. *Mr. Lethbridge.*] What about the natural enemies to the codlin-moth, do you know of any in New Zealand?—Yes.

51. But you do not think they are likely to make much impression on the moth?—There was a good deal of talk about a small enemy some time ago. It was found that it does not come out sufficiently early in the season to save the early apples. I might mention that it is an American insect, and the American Government has spent thousands of pounds on seeking and experimenting with the natural enemies of the codlin-moth, but so far without success, and they have given up expecting natural enemies to obviate the necessity for the use of mechanical control.

52. I know of an orchard which was brought under the notice of the Department which contained the codlin-moth. I was told that absolutely nothing was done to it, and the moth had disappeared. A peculiar thing about this orchard was that it was a very old one, and it was not until it was cultivated that it was found that the moth had gone. Did the Department hear of that?—One of the officers was told to go and see that orchard.

53. I was told that of the officers of the Department had been to the orchard with the microscope, and could find no sign of any insects?—I do not remember to have seen the report.

54. *Hon. Mr. A. Lee Smith.*] Have you in your experiments disregarded the fact of the orchard being a commercial success, and looked upon it purely as a demonstrative character?—The demonstration was the principal object we had in view, and we also tried to get as much out of the orchard as we could.

55. You have not tried in any way to spare expense in order to show a profit and loss?—Oh, no; our object was to make the thing a success.

56. Well, you consider that the reason why fruit-growing has not been a profitable business in the colony is mainly on account of the climatic conditions encouraging insect pests?—The principal thing is the codlin-moth; I am referring to the North.

57. In what part of the colony is the moth most prevalent?—The codlin-moth is worst in the North, and the scale is worst in the South.

58. *Mr. Bollard.*] You are aware, Mr. Kirk, that the codlin-moth has been much worse in the Auckland District than in any other part of the colony?—Yes.

59. You are aware, also, that the Auckland orchardists are very much concerned seeing that they have a larger area affected than any other part of the colony?—Yes.

60. Are you aware that the Auckland orchardists for some years have, through their representatives in this House, informed the Department that they have used every means in their power to make the orchards a success, but that they have failed. Are you aware the Department has been told that?—I am aware of that.

61. Are you aware that Auckland members have been for some years asking the Department to take up an orchard in the Auckland District and demonstrate to the orchardists there that you could deal with the codlin-moth and make the orchard a commercial success?—No, I am not aware of the commercial-success stipulation. That came in afterwards, as far as I am concerned. I am not aware that that was in the original proposition. If so, we should have refused to take over such a place as the Otahuhu Orchard and work on the lines laid down.

62. You are aware that the Department did take up two orchards to illustrate the fact?—One was really to illustrate the benefits of cultivation on the poor lands.

63. And then, at the suggestion of myself and others, you took up the Otahuhu Orchard?—Yes.

64. You had a free hand?—Oh, no, we had not. The committee asked us to conduct all sorts of experiments.

65. The committee appointed?—Yes.

66. Will you say that the committee's main object in carrying out these experiments was in order to deal with the codlin-moth or to deal with these orchards with the object of making them a commercial success?—All I know is that they were to report on this orchard year by year. The Department carried out the experiments at the request of the committee.

67. The committee have presented reports?—They have.

68. And they can be seen?—Yes; they are published.

69. And evidence was given by the Auckland orchardists?—Yes.

70. Do I understand that the Department did not take up this orchard but for the purpose of showing that they could control the codlin-moth?—As far as I could understand it, it was simply for the Department to demonstrate the control of the codlin-moth—of showing its ability to control the moth. If you can deal with that orchard, then you can take a better-kept orchard and can control that and make it a commercial success.

71. Suppose I am an orchardist with ten or twenty acres, carrying on certain operations with, say, 70 per cent. affected with the moth, then I cannot make the thing a commercial success?—Certainly not, unless you adopt measures to control the pest.

72. Let us definitely understand the position of the Department when they took up the challenge thrown down by the Auckland members to take up these orchards and experiment with them: to minimise the codlin-moth was to make them a commercial success?—As far as I can understand, it was for demonstrating the control of the codlin-moth under most adverse conditions.

73. There was a balance-sheet produced to this Committee last year, was there not?—Yes.

74. I think the orchard was stated to be in a good condition?—So far as the codlin-moth was concerned.

75. You cannot give us the commercial aspect of the question, but I think it is only fair you give us the weight of fruit?—Yes, we can give you the weight.

76. This is a very important matter to Auckland: do you desire to get two of the members of the committee down here to give evidence?—I do not see the necessity myself. You have got their reports for last year and their reports for this year.

77. Do you not think it would be desirable to have them here to cross-question them?—Personally, I do not think it necessary.

78. With regard to Waikumete, you have been there?—Yes.

79. You say the codlin-moth has not been considerably less there during the last two years?—I say with regard to the whole of the Auckland Province.

80. You say there is no reduction in the codlin-moth there?—I say I do not think so.

81. Would you be surprised to hear that every orchardist in Waikumete has told me that the codlin-moth has decidedly decreased?—I would be very pleased indeed to hear that.

82. Are you aware that in Waikato there are orchards that have been entirely neglected, not even the grass cut down, and the codlin-moth has decreased considerably?—The moth varies a great deal according to the season.

83. *Hon. Mr. Baldey.*] Do you think, after applying the various remedies, that the fruit will ever gain the natural quality and flavour?—If the remedies are supplemented by proper pruning, cultivation, and the application of fertilisers—always provided the trees have not been too much neglected.

84. I mean after having been infested with blight, and the various remedies have been applied, do you think the apples on these trees will ever retain their natural quality and flavour?—They may be made to do so.

85. And as regards cultivation and replanting, do you think it clears the ground of codlin-moth?—Oh, yes; undoubtedly.

86. *Hon. Mr. T. Kelly.*] What condition was this orchard in—the three acres—when you took it over?—Just about as bad as it could possibly be.

87. It was an old orchard?—Yes.

88. You say the object of the Government in taking over this orchard was to demonstrate how the codlin-moth could be done away with?—Yes.

89. So far as the American blight is concerned, is that plentiful in the colony?—Yes; it is pretty well scattered.

90. Is kerosene-spray used?—Yes; combined with soap or milk. It is successful in many cases.

91. *Hon. Mr. Duncan.*] Can you say what improvement this Bill would make if it passed?—It would do this: in the first instance, it would protect those people who are going in for orchards with the object of working them on a commercial basis; and it is, in my opinion, the foundation-stone on which the export trade of the colony must rest if it is to be carried to a success. You cannot expect people to go in for commercial orchards unless they are protected from their careless neighbours.

92. How would it affect the Auckland orchardist whose orchards are affected at the present time?—It would simply mean that he could adopt any measures he chose to keep his moth down. A number of Auckland people got disheartened some years ago in trying to suppress the moth. Many of them did not fully understand spraying. In many cases I have found orchardists departing from the instructions laid down. Instead of using the proper quantity of chemicals they have used more, even double the amount, in order, as they say, to kill the moth right out.

93. It is stated generally by the Auckland representatives that this Bill is going to kill the small fruit-growers in Auckland?—I do not think it would do so. At all events, there is the clause in the Act dealing with the exemption of any county.

94. But suppose the Bill passed without the clause?—I think that in the course of two or three years they would say it was the best thing they had done. For instance, Tasmania would not be able to export the million cases of apples now talked of if it were not for their Act.

95. You think the Bill would be beneficial?—I am sure of it. They cannot do without it in other countries, and I am certain we cannot do without it here.

96. *Mr. Lawry.*] Has the Department ever considered whether we could find a market to export our fruit to?—We can get a very good price for our fruit at certain times of the year in London.

97. Do you know if it paid to send the fruit to London?—Yes; there was a trial shipment, on which the Government agreed to guarantee 1d. per pound, but they were never called upon to pay it.

98. That was an experiment?—Yes; and therefore did not get on the market as well as other continuous shipments would.

99. In your experiments have you found that spraying has a tendency to destroy the natural enemy?—I do not think the natural enemy is worth discussing.

100. I want to know whether spraying has a tendency to destroy the natural enemy?—It would have the effect of checking it.

101. But would it not poison the natural enemy?—No.

102. Then it would destroy the moth without destroying the enemy?—Yes; it would do that, because the natural enemy is inside the egg. One species lives inside the egg, and another inside the grub of the codlin-moth, but neither of them in sufficient quantities to be of much practical use.

103. Is the Committee to understand that spraying does not destroy the natural enemy, but only destroys its food, the moth-grub, and so starves it out?—Yes; you can put it that way.

104. Then, in putting a thin coating of poison on the fruit to poison the codlin-moth does not the natural enemy eat that poison?—No; the natural enemy is predaceous, and eats the grub.

105. I would like to ask you, Mr. Kirk, if there has been any general demand from the orchardists in this country for the Bill?—I think the papers were submitted to the Committee a year or two ago, and, excepting Auckland and a small portion of Nelson, they were in favour of having the conditions of the Bill passed.

106. And now the only opposition is really from Auckland?—Yes.

107. I understand there is a clause in this Bill which makes it permissible in Auckland?—Yes.

108. And if Auckland realises at any time that it would be to their advantage to come in, they could do so?—Yes.

109. *Hon. the Chairman.*] You spoke about canning: were you referring to a canning plant being established by the Government?—No; I was referring to the co-operative canning-works.

110. Are they general now in the country—the canning-works?—No; some of them belong to private individuals, but there are two co-operative works at present.

111. Are there any in Nelson?—Yes, one in Motueka.

112. If the spraying is not regulated, does the codlin-moth get an opportunity of increasing?—Fruits do not all come along at the same time, and some varieties are not so liable to be attacked by the moth as others, and do not need spraying so often.

113. But the general practice is to spray the whole orchard?—Yes; but some varieties more than others.

114. *Hon. Mr. T. Kelly.*] With regard to climate and soil in New Zealand, which are the best districts with regard to climate?—That is a difficult question to answer. It depends so much upon the class of fruit you wish to grow. Portions of the Bay of Plenty are almost ideal, but there are many localities throughout the colony admirably adapted.

115. *Mr. Hogg.*] Do you think the small-bird complaint has any influence in keeping down the codlin-moth?—Very little.

116. Have any experiments in that direction been tried with regard to the effect of small birds on such things as the codlin-moth?—Yes; that has been watched very carefully, but its help is not very appreciable.

117. Have you heard whether in any other places besides Auckland—for instance, in the Wairarapa—there has been a very material diminution in the codlin-moth pest during the last year or two?—In certain places.

118. Do you know any certain places where no treatment has taken place whatever?—Yes.

119. Is there anything to which you can attribute this reduction in the pest besides the climatic changes?—No; except in places where you have gone in for protective measures.

120. *Mr. Bollard.*] Do you know of the sparrows affecting the codlin-moth?—No, I do not think so. The sparrow must as a rule be very hungry before he looks for insects such as the codlin-moth grub. He is much more likely to eat the apple than the grub.

THURSDAY, 3RD SEPTEMBER, 1903.

W. A. BOUCHER examined. (No. 2.)

1. *Hon. the Chairman.*] You are in charge, under the Agricultural Department, of the orchard at Otahuhu?—Yes, sir.

2. Have you had charge of it from the time the Government took it over?—Yes.

3. What state was it in at that time?—It was an orchard that had been neglected for a good many years. The trees were entirely overgrown, and infected with all kinds of diseases—with scale, mealy bug, and codlin-moth. The fruit from the trees was also infected with the apple-scab, and the limbs of the trees were covered with moss and lichen; in fact, the trees were in about as bad a condition as those in any orchard you could find in the colony.

4. At what period of the year did you take charge of the orchard?—In October.

5. What steps did you take?—The first step that I took was to spray the trees in order to remove the moss and lichen, following that up with spraying for the codlin-moth. That was in the first season.

6. Did you spray for the scale?—No; I did not consider that a matter of sufficient importance to go to extra expense. The orchard was taken over specially for spraying for the codlin-moth. I desired to keep down expenses as much as possible, and sprayed more particularly for the codlin-moth, after removing the moss and the lichen, which would harbour the moth. That was a necessary adjunct to spraying for the codlin-moth.

7. What state of cultivation was the orchard in when you got it?—It had been entirely neglected.

8. Was it in grass?—Yes.

9. Did you do anything in the way of cultivation?—The first season there was no cultivation at all.

10. You left it as it was?—Yes.

11. Was the rubbish cleared out, and so on?—That followed in the second season.

12. Was there any result during the first season in the way of produce?—The result was the reduction of the percentage of the moth—from the apples being absolutely riddled to a percentage of, I think, 38 per cent. clean. In the second season the reduction of the percentage of the moth was considerably increased, giving an average of about 90 per cent. clean.

13. Did you do anything the first year besides spraying, bandaging, and so on?—They were bandaged the first year.

14. That was all that was done?—Yes.

15. Then, how did you proceed the second season?—The second year the orchard was fenced in so that we could have pigs, in order to save the expense of gathering up the fallen fruit.

16. All of it?—Yes; the orchard was fenced in and divided into two parts, so that if it were necessary one part could be used for cultivation and without the pigs, and the other part with the pigs and without cultivation.

17. What else was done during the second season?—The bandages were used as an adjunct for trapping any grubs that might escape from the fruit.

18. What amount of spraying was done?—It varied between four and eight times, according to the different varieties. The early varieties were sprayed four times, and the very late varieties eight times.

19. Was the increase in the cost of management material the second year?—It was considerably increased the second year.

20. And the result?—The result was not altogether favourable the second year on account of the excessively low prices ruling in the market. One great difficulty in the matter is the amount of infected fruit that is allowed to be sold—hundreds of tons of it. I am obliged to go to considerable expense to get the orchard free from moths. The clean fruit is sold in Auckland in competition with infected fruit that comes from all quarters—the Auckland market in particular is affected in this way—and it is hardly possible to sell clean fruit at a profitable price. So that I am placed in a very anomalous position. I am compelled to go to a certain amount of expense to produce clean fruit, and that clean fruit has to go into competition with infected fruit from orchards where there has been absolutely nothing done.

21. What was the general result the second year as far as expenditure and returns went—a loss or a profit?—The balance-sheet was produced last season. I could not give the exact returns from memory.

22. Then we come to the third season—the last season?—Yes. This last season the results have been altogether different.

23. What did you do the last season?—Far less cultivation. Before the season commenced I

decided that, as it was very largely a question of commercial result, I would reduce the expenditure as far as possible. One section of the orchard was ploughed once only. During the third year, at the request of the committee, I kept one section without the pigs at all, so that the fruit might be gathered from the ground and counted, so as to give the percentage of infected fruit that fell to the ground. The pigs were shut out from one-half of the orchard in the early part of the season.

24. That was cultivated?—That had been cultivated previously. That was all the working during the season. That reduced expenditure to a certain extent.

25. Did the bandaging and spraying go on the same as in the former years?—The bandages were not used at all last season—that, again, at the request of the committee. At the end of the previous season we had some discussion upon the results obtained, and whether they were altogether reliable on account of the pigs and bandages having been used. At the commencement of the third season I discussed the matter with the committee, and we decided that it would be better to take the pigs off the orchard and leave it, so that the fruit might be gathered and counted for the percentage of infected fruit that fell to the ground. At the same time we decided that no bandages should be used at all—that the result should be a test for spraying, and spraying alone.

26. Did you approve of this course, then?—I was quite willing to accept their suggestions in the matter, because I am firmly convinced, and have actually proved, that the codlin-moth can be kept down by spraying, and spraying alone, although I would always suggest that bandages be used in connection with it.

27. What was the outcome of this year as far as receipts and expenditure were concerned? Is it shown in the balance-sheet that we have here?—Yes.

28. The receipts are shown at £84 3s. 1d., against expenditure £70 7s. 10d., leaving £13 15s. 3d. as the profit last year?—Yes. I must call attention to the excessively high rent, which no ordinary man would charge against his own place. That would really almost amount to a profit itself, or be considered with the profit.

29. Your other charge in the Auckland District has been as inspector, has it not?—Yes.

30. What have you reported as to the condition of the district during this past season?—Generally, the Auckland Provincial District is as badly infected, I think, as it ever has been, although one comes across occasional instances of orchards that are reported to be comparatively free from the moth.

31. Is the difference attributable to different treatment?—No. The orchards are certainly not generally sprayed. Apparently there is some parasite at work. An examination of the fruit in the Auckland markets last season was sufficient to prove that the Auckland Provincial District generally is very badly infested.

32. Is treatment general in the district, or not?—No. A few of the more progressive orchardists have already treated their trees, satisfactorily to themselves. But generally, apparently on account of the apples not being altogether profitable, the treatment has not been taken up. The reason why apple-growing has not been profitable is that we have not an export trade to regulate the price in the local markets. My opinion is that we cannot get an export trade of any importance until we get some measure which will bring about a general method of treating the codlin-moth.

33. Have the other pests, such as scale, been detrimental to the profitable condition of these orchards, speaking generally?—The most troublesome apple-scale is not prevalent in the northern part of the Auckland Province. It is only prevalent in the Waikato.

34. Is it attracting other fruits there, such as plums, or not?—No.

35. Is not that the same scale as attacks the plums and other fruits?—That same scale does attack a number of fruits.

36. Is that disease which is prevalent in some other parts of the colony prevalent in Auckland—the silver blight?—Yes. I have some trouble with it; but if it is taken in hand in time I do not regard it as a serious matter.

37. How do you mean "taken in hand in time"?—By removing the infected limb, or using a heavy dressing of manure and also a dressing of sulphate of iron.

38. Have you known of any actual cure by that treatment?—Yes, where it has not been allowed to go too far. If a tree becomes seriously affected right through to the roots the matter is hopeless, and it is far better to remove the tree itself.

[The following extract from Mr. Kirk's report for 1900 was handed in.]

SILVER BLIGHT.

This mysterious disease has been known for a long time, and each year its ravages increase. That is, perhaps, to be expected, as the area under cultivation becomes greater. It is readily detected at a glance, as the foliage, usually of a single shoot or branch, is seen to assume a shining silvery appearance; then another and another limb may be attacked, beginning at the younger shoots, or the disease may not spread.

Some years ago I made a number of experiments of which the following are the results, stated briefly:—

1. That, though I believe the disease obtains admittance to the plant through the leaf, &c., yet
2. It may be communicated from an affected to a healthy tree by means of the pruning-knife.
3. I have produced the disease by inoculation.
4. That there is no cure save the knife, and in this respect it seems to be on much the same footing as the pear-blight of America, on the investigation of which much money and the highest scientific skill in America has been expended.
5. Though spraying appears to have little effect I found that a liberal application of sulphate of iron to the roots certainly did considerable good, strengthening and pushing on the tree, thus enabling it to resist the disease to some extent. The use of Bordeaux mixture seems to have been slightly beneficial, as the trees not sprayed had certainly more silver blight than those treated, and, moreover, the spraying keeps down other diseases, so helping to maintain the health of the tree.

The experiments, however, need to be continued for several consecutive seasons, and on trees absolutely under the control of the Department. This, however, is not practicable until we have properly equipped horticultural stations.

Ever since 1894 I have recommended—

(1.) Cut out affected branches directly they are seen, and burn them at once.

(2.) Use two knives, the first for pruning until the sound wood is reached, and the second for cutting off a piece of sound wood, or else sterilise the knife before making the final cut.
(3.) Apply from ¼ lb. to 1 lb. of sulphate of iron to the roots, lightly worked in.
This is the only treatment that has done appreciable good.
That the disease is spreading is borne out by a reference to the reports of Messrs. Palmer and Blackmore.

39. *Hon. Mr. T. Kelly.*] A dressing of sulphate of iron to the soil or the tree?—The soil.

40. *Hon. the Chairman.*] Auckland is a very large district: are you the sole inspector in that district?—Yes; that is, for the outdoor work—visiting the orchards.

41. You have a very considerable duty if you go round them all, do you not?—Yes, it keeps me fairly busy.

42. Is one officer capable of going round the district inspecting?—Yes, so far as the industry has progressed at present, but if it expands as it should do it will be necessary to employ other officers.

43. I have been speaking of you as an inspector: what you really do is to go round and give advice, is it not?—Yes.

44. There is no such thing as inspection proper?—Not at present.

45. *Hon. Mr. Bowen.*] Is it customary in the North to put pigs into orchards?—No, it is not customary. It is done in a few instances. It might be of valuable assistance in reducing expenditure, on account of the pigs gathering up the apples as they fall to the ground, and the trouble and expense of gathering them being saved.

46. You do not think the pigs do any damage to the trees?—They do no harm if the trees are properly pruned.

47. They do not bark them?—No.

48. What do you spray with?—Last season I used arsenic and soda.

49. Does that affect the fruit?—No, not at all, except in keeping it free from the moth.

50. You did not deal with scale at all?—No.

51. Do you know of any reason from your own experience why the owners of orchards in New Zealand appear to be unable to compete with the imported fruit, such as apples? Is there any climatic or other reasons?—I certainly consider that we have an excellent climate and the most favourable conditions for producing fruit.

52. Ought not New Zealand to be an exporting and not an importing country with regard to apples?—Yes, certainly; and I feel sure that we should work up a very valuable export trade if we had some regulation for checking the ravages of the codlin-moth.

53. How far, in your experience, has the codlin-moth spread in New Zealand?—Over a very large part of the North Island. Some districts are at present clean, and it appears to me to be a great pity that they should be allowed to become infested by the transit of infected fruit. As far as the South Island is concerned, I believe—I am not very well acquainted with it—that it is the Nelson District and part of central Otago that have been worst infested.

54. Are any steps being taken to clean them?—I think some of the growers there have taken up spraying as a remedy.

55. *Hon. the Chairman.*] Have you been there?—No, not to Nelson.

56. *Hon. Mr. W. Kelly.*] You show in the statement of expenses and receipts an amount for spraying?—Yes.

57. Is that the cost of spraying and providing the material?—It is for the material alone. The labour is shown separately.

58. Then, you said that your clean fruit was difficult to sell in the Auckland market in consequence of the quantity of diseased fruit offered?—Yes; I found it practically impossible to sell clean fruit there at a reasonable figure.

59. *Hon. the Chairman.*] At a paying figure you mean?—Yes; so much so that last season I shipped all the fruit to Wellington. It really seems absurd to have to pass what should be your best market and send the fruit at greater expense to a market far distant.

60. *Hon. Mr. W. Kelly.*] What did the fruit realise in the Wellington market?—One variety—the best dessert variety that we have there—realised 7s. 6d. to 12s. a case.

61. Did you sell any at Auckland?—Only the apples that I did not care to send to Wellington.

62. What did they fetch?—A lower price—from 1s. 6d. to 2s. 6d. a case.

63. They were partly destroyed, I suppose? Was that why you did not send them to Wellington?—They were only third-rate fruit. The first and second qualities I sent to the Wellington market, as being the market that would give a reasonable price for the fruit. The third-quality fruit I sent to the Auckland market, like the rest of the growers in the district.

64. *Mr. Bollard.*] You stated that the rent charged is too high?—Certainly, £6 an acre is a high rent to charge for ordinary land.

65. This time last year, when before this Committee, you stated that you had the orchard in good order?—Yes.

66. You also stated that, in consequence of the great expense in bringing a neglected orchard to the condition that you had it in, it would not be fair to show a balance-sheet as a commercial success?—Yes.

67. Supposing the orchard was your own, and you had it in the same condition that you had it in last year, and you wanted to let it to me, would it pay you to let it at a lower rent than £15?—That is rather a difficult question to answer. You can grow equally good fruit on land that is worth only £1 an acre in the Auckland Province.

68. *Hon. the Chairman.*] What would be the ordinary value of orchard land under proper cultivation? Would the rent for it be high?—I certainly would not pay more than £1 10s. an acre at the present time for any land planted with apple-trees.

69. *Mr. Bollard.*] What do you consider the value of the land?—I do not consider an apple-

orchard in the northern district is really worth having under present conditions; in fact, it has come to this: that in a great many districts where dairying is carried on the apple-orchards have been allowed to go back. In some places they have been actually taken out.

70. That is not the question. Supposing you had planted an orchard yourself—that you purchased trees at the ordinary price, planted them, and got the orchard into a profitable condition, and attended to it until you expected to get some return—say, £5 or £6 a year—what do you consider would be the value per acre of an orchard like that? What would it cost?—The value to the owner would be a very different thing to the value to the purchaser at the present time. It would cost a lot of money to plant an orchard and bring it into bearing.

71. How much? I do not want to take an unfair advantage of you. I want to know whether £15 per annum is too much for a man to claim as interest on his outlay—as the rent of an orchard in good condition, as you said yours was last year?—In that case you would want to take the first cost of the land, the cost of the trees, the cost of cultivation up to the time of bearing, and everything else. I could give you that, but I should like to have a little time for consideration.

72. You put down £15 as the rental in this statement, and then you say in your report that it is too much to charge. I want to know whether it is too much or not, taking into consideration the cost of getting it into full bearing?—It would take some little time to think it out.

73. You are not prepared to say at the present time whether this £15 for rent is too much or too little?—I consider it excessive.

74. Will you tell the Committee why?—The land is at Otahuhu, which is almost a suburb of Auckland, and land there is worth from £50 to £70 an acre.

75. *Mr. Kidd.*] What is the extent of the orchard?—There are 2⅛ acres under trees.

76. *Mr. Bollard.*] Five per cent. on the value of the land is a very small matter in a question of the expense of getting an orchard in this condition. It is the planting, and the getting of it into full bearing?—The condition of the orchard when we got it was such that the owner was actually taking out the trees.

77. You say you have it in good order and in full bearing, and that has been done at the Government expense?—Only partly. The trees were grown before we took them, but they were in a very bad condition. We simply remedied the condition of the trees.

78. You admit that last year the orchard was in good order. Assuming it belonged to you, and it was in good order and bearing, do you think that £15 would be too much for the rent?—Yes, I do.

79. What do you consider would be a fair rent?—Under present conditions I myself should not be prepared to pay more than £1 10s. an acre for land there bearing apple-trees.

80. *Hon. Mr. Bowen.*] With trees five years old planted on it?—Yes, with trees five years old.

81. *Mr. Bollard.*] Does this area of orchard include the shelter-beds around?—No; it is just the actual area under trees alone. There are 2⅛ acres actually in apple-trees, according to my own reckoning.

82. What is the total area rented?—Probably about 3 acres. Before we took the place over some rows of trees had been removed in one part, and that land is not actually under apple-trees.

83. As a matter of fact, you do not know the exact area that the Government have rented?—We have not had it surveyed.

84. Do you consider this balance-sheet satisfactory from a commercial point of view?—I do, taking this fact into consideration: that under ordinary circumstances a grower would do a great deal of the work himself, and with the assistance of his family, and he would use his own horse. That would allow of a very fair margin for profit.

85. You stated that one drawback that you experienced in connection with the sale of the fruit was the fact that there were hundreds of tons of infected fruit sold in the Auckland market?—That is so.

86. Supposing that was all clean fruit, would you get a better price?—Decidedly. The very first result of preventing the sale of infected fruit would be to increase the price of apples to such a profitable figure that a grower would be fully justified in giving, and would be glad to give, all the care he possibly could to his apples.

87. Supposing that the hundreds of tons of infected fruit that you say is sold in the Auckland market was all clean and sound, do you think you would sell your fruit better in Auckland? Would there not be more?—Not if there were a very large quantity of clean fruit. The price of the clean fruit would certainly begin to drop, but then we should establish an export trade.

88. I am leading up to this: as to whether you would suggest to relieve the market. Supposing the fruit was all clean, would you suggest exporting it, or canning, or preserving of some sort or other?—I should suggest establishing an export trade with apples of the best quality. With other varieties not suitable for export, but suitable for canning purposes, I would advocate putting up a really good canned article. Fruit that was not suitable for that could be used for pulp.

89. Do you favour dried apples here?—I do not altogether, on account of the enormous expense involved in drying fruit, and the fact that in a great many districts where apples are largely grown fuel is very scarce.

90. Do you think the Government should assist the fruit-growers in establishing canning-factories, and so forth?—I do, most decidedly.

91. *Hon. the Chairman.*] Can the Government reasonably assist: are there any means by which they can do so?—There are no means at the present time, but I hope that the Government will see their way to pass a Bill to enable the Department to assist the fruit-growers in establishing canneries, and possibly, in connection with them, distributing agencies, so that the fruit may be better distributed in the colony and an export trade initiated.

92. *Mr. Bollard.*] You consider that it would be a great boon if we could manage to keep for our own use in the colony the £120,000 that goes out every year for fruit?—Undoubtedly it would make a vast difference in the welfare of the colony generally; but in the first place I cannot hold out any hope of any expansion in the fruit industry until we get an Orchard and Garden Pests Bill.

93. How would you suggest that the Government assist the fruit-growers and the fruit-canning?—By advancing funds, say, on the security of the land, buildings, and necessary appliances in equipping the buildings; that would leave any shares that would be taken in a company for working capital. That is only a suggestion. There is one difficulty that we meet with in the fruit industry that has not been met with in dairying, for instance, and that is the scattered nature of the fruit settlements and the fruit-growers generally. It is practically impossible to bring them and keep them together. So that it would be necessary to advance funds for the interests of the fruit industry on different terms to those on which funds have been advanced in the dairying industry.

94. *Mr. McLachlan.*] Are the Auckland-grown apples suitable for cider-making?—There has been some very good cider made in the Auckland District, but you cannot make the best cider from codlin-moth apples. And if you get an inferior quality of cider you are hardly likely to get a good market for it.

95. Do you know the Styx apple-orchard?—I have been there.

96. Could you grow as good quality of apples for cider-making in Auckland as they grow there?—Undoubtedly. The difficulty has been that they have not planted the right varieties for cider-making up to the present time; they have not extensively cultivated.

97. *Mr. Bollard.*] What is the average percentage of market fruit in the whole orchard, counting the windfalls as well?—I cannot give you that, because I should have to work it out from the percentage of infected fruit and the percentage of clean fruit given in my report.

98. Will you say it is not 32 or 33 per cent.?—The percentage of infected fruit gathered from the ground was 33½ per cent.—that is, there was about 77 per cent. of clean fruit gathered from the ground—77 per cent. of the windfalls was clean.

99. What I want is the average percentage, taking the windfalls and all the other apples into account?—That I could not give you without working it out from the statement.

100. *Mr. Massey.*] Have you got the orchard at Otahuhu in hand now?—Yes.

101. Do you intend to continue your expenses during the coming season?—Yes.

102. I think you told us that the orchard was in a very bad way at the time it was taken over by the Agricultural Department?—Yes.

103. Do you know how many years it had been neglected?—Several years before we took it over. I could not exactly say how many.

104. When you say it was neglected you mean that nothing was done in the way of spraying or bandaging?—Nothing was done for several years.

105. But the trees were well grown, the soil was good, and so on?—The trees were decidedly overgrown.

106. But the soil was good?—Yes.

107. Was it suitable soil for fruit-growing purposes?—Yes, very good soil for an orchard.

108. Was it necessary, then, to go to a lot of expense to bring the orchard into fair condition?—It was absolutely necessary, because the trees were so overgrown and the branches so much interlaced that it was practically impossible to get the spray inside the trees.

109. You think that the orchard is in fair condition now?—Yes, except that I could never reduce the trees to their proper size. They are far too high. I would not think of allowing trees to arrive at that condition.

110. You have had the orchard in hand for two years?—For three years.

111. Has it been necessary for you during the last year to give much of your own time to supervision, and so forth?—I have given very little of my time.

112. Did you have a good man there?—He is a good man now.

113. Something in the way of a manager?—One of the great difficulties is that the orchard at Otahuhu is not large enough to employ a competent resident manager. The first man I discharged. I took on another, and taught him what he knows at the present time.

114. How much of this second man's time is occupied in looking after the orchard?—I could not tell you exactly, because I employ him for, say, three weeks at a time, and then he is off for perhaps two months.

115. Does the £25 16s. shown in the balance-sheet represent the whole of the expenditure in connection with labour, including picking and packing the fruit?—Yes, spraying and picking and packing.

116. Can you give the Committee any idea of what the expenditure was in connection with picking and packing alone? I want to get the actual expenditure in connection with cleaning, spraying, and so on?—I could give you the details, but I have not got the figures with me.

117. Is it necessary for you to visit the orchard yourself during the fruit season?—Yes; I visit it occasionally to see that the work is going on all right, and to give general instructions for the intervals when I am not able to be present.

118. How often?—It varies, according to the other work that happens to be on hand and the necessity for my being present there. Last season at intervals of about a fortnight or three weeks I was there, with the exception that in the early part of the season I was away altogether for six weeks on one occasion.

119. That is to say, you visit it once every fortnight or three weeks?—I do if I can. There are times when I am not able to visit the orchard even at those intervals, and then I send written instructions.

120. The whole cost of labour is shown in the balance-sheet at £25 16s: do you not think

that in compiling a balance-sheet something ought to be charged for management or supervision?—I do not think so. I think we ought to consider this orchard just as an ordinary orchard, where a man would supervise his work himself.

121. But it is a fact that in the balance-sheet nothing is charged for management?—There is nothing charged for my supervision.

122. Is it not a fact that there are certain varieties of apples that are to a certain extent proof from the codlin-moth?—Some varieties of apples take the moth less than others.

123. Have you any of them in this orchard?—No. All the varieties there are very much subject to the attack of the moth.

124. Have you got any of the Gravenstein variety?—No.

125. I suppose the Gravenstein is one of the varieties that are to a certain extent free from the moth?—Yes; it frequently happens that the Gravenstein is to a certain extent passed over by the moth, even in orchards which are badly infested.

126. To do justice to any orchard, during the fruit season, at what time is it necessary to commence operations in the way of cleaning, and so forth?—I commence operations at about the beginning of November.

127. At what time did you commence at Otahuhu on the first occasion?—On the last day or so of October. Last season we had a very late season—it was almost the middle of November before very much was done.

128. Did I understand you to say that, as far as the moth is concerned, the Auckland Provincial District is as badly infected as others?—I think it is.

129. Have you not heard from orchardists all round that the moth is disappearing?—I hear of occasional instances, which I believe to be authentic; but it is not general by any means.

130. Would you be surprised to hear of an orchard where nothing was done in the way of spraying or bandaging and yet the average percentage of clean fruit there was 90 per cent.?—I should not be surprised if it had been neglected for a number of years. I will explain that. There is a parasite that is working in neglected orchards; but the trouble with the parasite is this: as long as the fruit is left the parasite is on the increase until there is a certain percentage of clean fruit available for market. Directly that percentage is obtained the grower sends his fruit to market, and with his fruit he sends away the parasite, and in a very short time he has reduced it so far that it is of no value in his orchard, which is as bad as ever again with the codlin-moth. That is what has actually occurred at Mr. Parr's place. Last season I saw his orchard, and the fruit was as bad as it could be. Three seasons before his fruit was fairly clean—I believe the percentage of clean fruit was about 75—and he felt it worth while to send it away, and with the fruit he sent away the parasite.

131. This parasite is, then, the natural enemy of the moth?—Yes; but it does not work out satisfactorily, for the reason that I have given. Frequently you get a sufficient percentage of clean fruit, and with the fruit you send away the parasite, leaving the moth behind.

132. Does not spraying destroy the parasite?—No. It is a parasite of the egg, and the egg of the parasite being lodged in the egg of the moth it is beyond the reach of any spray that may be used.

133. Will you describe the parasite as far as you can?—In its mature form the parasite is a very minute fly. The fly lays two and sometimes three eggs in the egg of the codlin-moth. The eggs are hatched, and the larvæ inside of the egg prevent the grub of the codlin-moth itself from developing at all, and emerge as parasitic flies again. It being a parasite of the egg, I am afraid we cannot hope for any really good results from it. If it were a parasite in any other form we might hope for something from it. But, as I have explained, directly you get a sufficient percentage of clean fruit to make it worth your while to export it, you ship the clean fruit, and with it is taken the parasite.

134. The same thing would apply to an orchard where the fruit was eaten by pigs—where the fruit was allowed to drop to the ground?—Yes, largely.

135. How long is it since the parasite made its appearance?—I noticed it, I think, three years ago.

136. Do you not think it is increasing in numbers?—I dare say it is in neglected orchards. It simply means that to derive any benefit from the parasite you have to leave the fruit there—you must not carry it away.

137. Nor allow it to be eaten by pigs?—No.

138. I suppose you are of opinion that, so far as Auckland is concerned, the principal difficulty in the way of pests is the moth?—Yes; as far, at any rate, as this Bill is concerned, that is the one that has been taken up, and I am sorry that it has been taken up so strongly, because it appears to me that it is obscuring other matters that are of really greater importance.

139. I think I heard you raise an objection to exporting fruit to Wellington by saying that it was a pity to pass your best market—Auckland—and ship to Wellington: is it not a fact that there is far more fruit produced in the Auckland District than can possibly be consumed by the people there?—There is no doubt that we should need other markets besides the Auckland market; but what I mean is this: As far as clean fruit is concerned, the Auckland market will not pay for it, on account of the enormous quantity of infected fruit that is always coming in there and bringing down the price of clean fruit to an unprofitable figure; so that for clean fruit you have to pass what should be your best market—the Auckland market. I had to do that last season. I sent the fruit to the Auckland market in the early part of the season, and the prices ruling would not pay the expenses of picking and packing. I commenced to ship to Wellington, and realised better prices, with the result that at the end of the season I was able to show what I consider a fair profit. But I had to pass what should be the best market with every shipment.

140. Do you think that the passing of the Bill before the Committee would be beneficial to the Auckland fruit-growers?—I am quite sure of it.

141. You know, of course, that there is a certain amount of opposition to it?—Yes, but the objections do not amount to very much. They have been reduced to really very minor points.

142. What do you think of this clause which exempts Auckland from the operation of the Act under certain conditions—clause 22?—I think it is altogether, for the Auckland people themselves, a very great mistake, and will do Auckland a vast amount of harm. I believe the growers themselves are beginning to realise that they should come under the general working of the Act.

143. The effect would practically be to prevent export from Auckland, would it not?—No, it would not amount to that—the clean fruit could be exported.

144. You think it is possible to get a certain amount of clean fruit for export purposes?—It all depends on whether the Bill is brought into force or not.

145. I mean under existing circumstances?—No.

146. There is no clean fruit under existing circumstances?—Not sufficient for export to outside markets.

147. When you say "outside markets" do you mean in the colony or outside?—Outside the colony.

148. Supposing that the Bill was passed this session, when do you think it would be practicable to bring it into operation?—In about three years from now.

149. Do you think that a clause providing that the Bill should not come into operation until two years from now would be an advantage?—I do not see that there would be any necessity at all for the clause, because the Act would be administered under the Department, and by instructions from the Department no active operations would be taken during the first season, and probably very little action during the second season; it would only be the third season when active measures would be taken, particularly with the codlin-moth.

150. *Mr. Rhodes.*] When did the parasite which you referred to just now appear?—I noticed it at Mr. Parr's place about three years ago.

151. Do you think it has been introduced into this country, or that it came in apples from Australia?—I think it probably came in apples from the States.

152. Do you know the name of the fly?—Yes; it is the *Trichogramma pretiosa.*

153. Do you know of any other natural enemy to the codlin-moth?—No, I do not know of any other.

154. You say that the second year's working of the orchard at Otahuhu was not very profitable?—It was not, on account of the ruling prices for fruit throughout the markets of the colony being so low. It was practically impossible to find a profitable market for really good clean apples.

155. That was on account of it being a good year for apples?—Yes.

156. Was the crop in this particular orchard a good crop?—Yes; it has been a good crop every season.

157. It was only on account of the ruling prices that the second year's working was not very profitable?—Yes.

158. *Hon. Major Harris.*] What age were the trees in the Otahuhu orchard when you commenced?—Fifteen or sixteen years, I believe. I only know the history of the place from hearsay.

159. *Hon. Mr. T. Kelly.*] You stated that during the first season you sprayed the trees to remove moss: what kind of spray did you use for that purpose?—I used what we term the Bordeaux mixture—*i.e.*, sulphate of copper, lime, and water.

160. Is that effective?—Yes, perfectly.

161. *Hon. Mr. W. Kelly.*] You said that you used that to the soil?—No; that was sprayed on to the trees.

162. *Hon. Mr. T. Kelly.*] When you first got possession of the orchard had it been used by the owner—had it been worked by him to get the best results in producing fruit?—It had by a previous owner, but he sold the property.

163. Did you find it, then, in a very neglected state?—Yes.

164. Would you, for commercial purposes, have taken that orchard at any rental whatever?—I certainly would not myself. We took the orchard simply because it was recommended by the committee of Auckland fruit-growers, and suggested by them as being the worst they could find, as a place for a fair test for spraying, in a really bad orchard, for the codlin-moth.

165. As an object-lesson?—Yes.

166. Not for commercial results?—No.

167. In dealing with fruit is it not the sale of the apples that gives the best result if there is a good price to be obtained, rather than canning, drying, or pulping?—Generally, yes. You mean the sale of the apples fresh?

168. Yes?—Yes.

169. And then these other things would be simply to use up the second- or third-class varieties of the fruit?—There is an increasing market for really good canned apples.

170. A profitable market?—Yes, a profitable market.

171. *Hon. the Chairman.*] In the colony?—Yes; and outside.

172. *Hon. Mr. T. Kelly.*] You talk of applying sulphate of iron to the trees as a dressing: what strength was the solution? Did you apply it in the crude state for the silver blight?—It is used pulverised—sowed over the ground at the roots of the trees.

173. To what strength?—From ½ lb. to 1½ lb., according to the size of the tree.

174. That has a good effect?—It acts as a tonic to the sap of the tree, and gives the tree better resisting-power to throw off any disease.

175. It circulates in the sap?—Yes.

176. And is in that way effective?—Yes.

177. Do you spray the trees at all in dealing with the blight?—No; spraying does not seem to affect the blight.

178. *Hon. the Chairman.*] Is the expense of that treatment—*i.e.*, the application of the

sulphate of iron—material?—No; it is very cheap. The sulphate of iron is worked into the ground.

179. *Hon. Mr. Duncan.*] With regard to the Otahuhu orchard, was it not a committee of fruit-growers that recommended this orchard to be taken?—Yes.

180. They selected it as the worst to deal with?—Yes.

181. And it was handed over for the Government to experiment with—to show what could be done with the pest?—Yes.

182. Mr. Bollard put some questions as to the financial aspect of the matter. Was it an orchard, in the first place, that you would class as suitable for the best results in the way of profit?—Decidedly it was not.

183. Where did you consider it should have been different? Was it in the class of fruit produced, the way in which the trees were planted, or the way they had been attended to up to the time you took the place over? In which way was it not, in your opinion, what it might have been?—It was the class of trees, and the way in which they had been attended to up to the time of my taking the orchard in hand.

184. Were they the most profitable class of trees that you would expect to grow fruit from for sale in the Auckland market?—No. One variety is fairly profitable.

185. What proportion did that variety bear to the number of trees in the orchard?—I could not tell you that without working it out.

186. How many trees are there in the orchard altogether?—I have the number here—229 altogether.

187. Were there forty of these that you would class as a suitable sort for producing apples for sale, out of the whole lot—I do not want the exact number?—It would be about one-third.

188. If the orchard had contained a better class of trees, would the results now have been very much better than they are, or would they have been worse?—If the orchard had contained different varieties and a more profitable class of apple the results would have been far better.

189. Do you think the orchard as it is would pay for keeping—as a paying orchard?—Well, not under present conditions. The trouble is this: With our summer apples—and the larger number of trees at Otahuhu produce summer fruit—we have to meet in occasional seasons excessive supply, and the price of clean fruit during a season when the glut is excessive is really not remunerative at all.

190. What would be about the best-paying size for an orchard if a man had a family, or if he had not a family, to help work it?—From 15 to 20 acres.

191. How many men would be required to attend to an orchard of, say, 20 acres during the summer?—A man could manage a 20-acre orchard most of the season by himself, but during the gathering season it would be necessary for him to employ extra labour.

192. Would you prefer keeping an orchard in grass, or delved with a horse-hoe?—Decidedly under cultivation.

193. Under any circumstances you do not think this orchard at Otahuhu would be a paying orchard?—I consider that last season we made a fair profit, but that is not to be relied upon during a number of seasons on account of the varying prices in the markets. If we had anything like a reliable market from season to season money would be made from that orchard; but the prices next season, say, may be next to nothing.

194. Do you know anything about the orchards north of Auckland?—Yes; I have visited all through the Auckland Province.

195. Have you been at Port Albert?—I have.

196. Have you been in an orchard there belonging to Mr. L. P. Beecroft?—Yes.

197. What is your opinion on the proportion of fruit that that orchard carries as against the one you are operating on?—I have not been there at the time they gather the fruit.

198. Have you not been there when the trees were in bearing?—No.

199. Are you aware of the size of the orchard?—I could not tell you now what size it is. I visit so many places that it is practically impossible to bear in mind the acreage of the different orchards.

200. Would you suppose it is 15 acres, or more?—Yes, I believe it is about that.

201. Have you had any conversation with Mr. Beecroft about the codlin-moth or about the Bill?—I know that he is in favour of the Bill, and that he considers it would be extremely beneficial to the whole of the Auckland Province.

202. *Hon. the Chairman.*] We have some interesting information in last year's report about this parasite that destroys the codlin-moth egg. There is some evidence by Mr. Boucher in it, and I want to get it in in connection with his evidence now. You know your evidence last year in this respect, Mr. Boucher?—Yes.

203. Your statement here in this report showed the result of the investigation that you made, as you were asked?—That is so.

[Extract from Report of Government Biologist, Mr. T. W. Kirk, 1902, produced, as follows.]

CODLIN-MOTH PARASITE.

Last year a great deal was said in Auckland about a natural enemy of the codlin-moth in Mr. Parr's orchard. Mr. Boucher, who made the discovery, gave a very full account of the matter in last year's annual report.

The parasite was discussed at some length at the Horticultural Conference. I mentioned that, Mr. Boucher having procured some specimens for me, I, knowing that Professor L. O. Howard, of Washington, had paid particular attention to the possibility of fighting the codlin-moth by means of parasitic insects, sent them to him, and received the following reply: "The parasite which you sent, raised from eggs of the codlin-moth, is apparently *Trichogramma pretiosa*, Riley. This is the same parasite which has been reared from the eggs of the codlin-moth, in New York State, by Mr. M. G. Slingerland."

I repeat the warning so often given, not to rely too implicitly on natural enemies. If the Americans, with their magnificent advantages, had not been able to derive any substantial assistance from the cultivation of parasites, it was not likely we should.

Mr. Boucher was asked to closely watch the insect, and report at the close of the 1901–2 season. His memorandum attached shows the desirability of adopting mechanical means for the control of the pest, and demonstrates the necessity for the warning above mentioned.

"CODLIN-MOTH PARASITE (*Trichogramma pretiosa*).

"Investigations this season of the effect of this parasite tend to show that, as far as early and mid-season fruit is concerned, little or no appreciable benefit in a substantial reduction of the proportion of moth-infected fruit is derived. A brief consideration of that period of the life-history of the parasite which bears upon this point will explain the reason for this. As the parasite remains dormant in the egg of the codlin-moth during the winter and spring months, it is evident that the numbers of the parasite that will again be present at the commencement of each fruit season to continue the destruction of the codlin-moth eggs will depend upon the number of parasitised eggs that remain uninjured during the winter, the proportion of which under ordinary circumstances, and without artificial assistance, will be very small, so that the parasite commences each season heavily handicapped for its good work by its sadly diminished numbers. Although multiplying again rapidly, the season is well advanced before it becomes sufficiently numerous to destroy the eggs of the codlin-moth in such numbers as to perceptibly reduce the percentage of infected fruit. Thus, while the percentage of moth-infected fruit of early and mid-season varieties remains much the same, a percentage of the fruit of the latter varieties will apparently be saved from the moth.

"W. A. BOUCHER."

204. Have you anything you can say in addition to that, Mr. Boucher?—I consider that the parasite is of no practical value for the reason I mentioned: that directly an orchard gets a sufficient percentage of clean fruit to make it worth while to send it to market the owner ships it away, and with the fruit he sends away the parasite. That actually happened at Mr. Parr's place.

205. You said just now that there were particular varieties of apples which were least subject to devastation?—They all take the codlin-month, more or less. The Gravenstein is one that Mr. Massey mentioned.

206. Will you name such sorts as occur to you, please?—That is the principal variety. I think the Winter Majetin is another that is less subject to codlin-moth than others.

207. There is no considerable number of varieties of apple that can be put in that category?—No. I do not know that from a practical point of view it is really worth considering.

208. *Hon. Mr. T. Kelly.*] In my district the peach-trees have been entirely destroyed by a blight which attacks the young shoots and makes the bark rigid and brittle. Have you treated peach-trees at all?—Yes. I think the most effective remedy is spraying the trees, just as the buds are swelling, with 10 lb. of sulphate of copper and 10 lb. of lime to 40 gallons of water. You will find that a very effective remedy.

209. That is, before the leaves come?—Just as the buds are beginning to swell. I think the best time is between the 7th and the 14th August.

210. Did you find formalin very effective?—It is fairly effective; but I do not rely on that so much as on the Bordeaux mixture, because the latter has an after-protective effect which other mixtures do not have. Trees that are sprayed with the Bordeaux mixture as the buds are swelling retain the protective effect of it for fully a couple of months.

211. It would not do to spray with that strength when the leaves were out?—No, decidedly not.

212. *Hon. Mr. Bowen.*] You said, incidentally, that you were afraid that this Bill rather obscured a more important question, or postponed it?—That is so.

213. What is that more important question?—There are three very important points that ought to be considered—from my point of view, at any rate. In the first place, growers are not fully protected against the introduction of pests from outside; and, while other countries have been increasing the scope of their Acts, we have done nothing to increase the scope of our Act for the last eight years at least. If we take the present Act, we are not protected against the introduction of diseases from outside the colony. In the second place, there is nothing to prevent the dissemination of pests from infected districts in clean districts; and, thirdly, it is practically impossible for any one to start an orchard in any part of New Zealand without starting well stocked with pests of every description, for we have no control over them. There is nothing to prevent nurserymen from sending infected trees from their nurseries.

214. You think those points are almost more important than the codlin-moth question?—I think the codlin-moth question has really absorbed so much attention of late that other questions of vast importance have been placed in the background.

215. *Mr. Bollard.*] It was agreed at the last meeting that you were to supply the weight of fruit: can you do so now?—I could, but I have not got the particulars with me. I have the total number of cases—322.

216. Have you got a book showing details of the expenses?—I have, but I have not got it with me.

217. Does anybody audit your accounts?—I hardly think that is necessary. I think I might be trusted to keep an ordinary statement in a small way like that of a small orchard.

218. *Mr. Massey.*] Does the £1 2s. 9d. shown in the balance-sheet represent the whole of the expenditure for material last year?—It does, and I have some still on hand. The reason is this: Last season I used arsenic and soda. That is very economical. A pound of arsenic and two pounds of washing-soda, which costs 8d., are sufficient for 700 gallons of lime-water. The lime-water is made by using 60 lb. of lime to 700 gallons of water.

219. Do you think the arsenic and soda is as good as any other solution for the purposes in view?—For general purposes I would prefer arseniate of lead. It is more expensive, but it is safer.

220. I think you stated just now that nothing had been done during the last seven or eight years in the way of giving protection to fruit-growers from the importation of insect pests: did you express an opinion to that effect?—I might perhaps be allowed to withdraw the number of years. What I mean is this: that we are not adequately protected under the present Act from the introduction of pests from outside. Might I be allowed to state it in that way?

221. Are you aware of the existence in the Cook and other Islands Government Act of last year of the following clause: "The Governor may from time to time, by Order in Council, prohibit absolutely, or except in accordance with regulations under this Act, the introduction into New Zealand proper from the Cook or other islands of any plant, fruit, fungus, parasite, or any other thing which in his opinion is likely to introduce insect pests or disease"?—Yes.

Mr. Ritchie: May I be allowed to answer that question? We are not able to get a Proclamation issued under that clause. The Law Officers advise that it is bad. If this present Bill is passed we shall have full power, because it is embodied in the present Bill.

Mr. Massey: This was a clause taken out of your Bill of last year and inserted in the Cook and other Islands Bill.

Mr. Ritchie: That may be, but that is what the Law Officers say.

APPENDIX.

OTAHUHU DEMONSTRATION ORCHARD, SEASON 1902–3.

Expenditure.	£	s.	d.	*Receipts.*	£	s.	d.
Rent*	15	0	0	By Sales of apples..	65	6	3
Labour†	25	16	0	Twenty cases for exhibits, &c.	5	0	0
Fruit-cases, cartage, freight, &c.	9	11	11	Tools and appliances on hand, less 5 per cent.‡	13	16	10
Horse-hire, ploughing	4	5	9				
Spraying-materials	1	2	9				
Tools, appliances, &c.	14	11	5				
	£70	7	10		£84	3	1

* The above rent would certainly not be paid under ordinary circumstances for 2½ acres of orchard in apples, the agreement for this amount being made because the orchard was offered as, and admitted to be, a fair type of the worst class of orchard to be found in the colony. The owner intended utilising the land for other purposes, which would have given far better returns than the crops of apples from the existing trees.

† In any orchard that had been well looked after from the time of planting, and with expert assistance for packing, the cost of labour would be about one-half of the above.

‡ The depreciation of value of tools as set down much exceeds the actual depreciation, as the implements are really very little the worse for wear.

Auckland, 31st July, 1903.

SIR,— Re *Orchard and Garden Pests Bill.*

I am directed by the Auckland Fruit-growers' Union to forward you the following resolution adopted at a meeting of the Executive Committee held this day:—

"(1) That the Department of Agriculture has not yet demonstrated that the codlin-moth can be suppressed on commercial lines; and (2) that the Orchard and Garden Pests Bill now before the House, if passed into law, will prove an unjust and harassing enactment to a very large number of fruit-growers in the North Island who are earning their livelihood in the industry."

I have, &c.,
J. H. MACKIE,
General Secretary.

The Hon. the Minister for Agriculture, Wellington.

SIR,— Pinegrove Orchard, Port Albert, 22nd August, 1903.

There is already a stir against the proposed legislation on fruit-culture, but if it comes from all places as from here, such noise need not be considered. As a matter of fact, growers who represent nine-tenths of fruit-exporters from this district favour legislation.

We do not approve of clause 22, making special provisions for the Auckland Province. It spells ruin to us. All the colony should be included in the Act. And we fear that County Councils will be incompetent to administer the Act thoroughly or fairly. The present pomological staff could be the Chief Inspectors under the Agricultural Departments of each centre.

Yours, &c.,
L. P. BECROFT.

T. Y. Duncan, Esq., Wellington.

Auckland Fruit-growers' Union, Auckland, 27th August, 1903.

SIR,— Re *Orchard and Garden Pests Bill.*

I have the honour to inform you that at a meeting of Auckland fruit-growers held under the auspices of the union the following resolutions were unanimously adopted, with instructions that they be communicated to the Hon. the Minister for Agriculture:—

"Although this meeting of Auckland fruit-growers deems it unadvisable to pass any repressive orchard legislation until the commercial success of the experiments now being conducted for the repression of insect and fungoid pests has been amply demonstrated, it would urge upon the Government, should such legislation be enacted, the following alterations in the Bill as at present drafted: (1.) That a 10-per-cent. allowance be made upon fruit transhipped from one part of the colony to another which is presumed to be clean when shipped and found to be infected at the port of arrival. (2.) That infected fruit used for pulp-making be allowed to be moved from orchards to any jam-factory within its own provincial district. (3.) Provision for compensation to be made where orchards yielding an income are wholly or partially destroyed when extreme action is taken by the authorities."

I have, &c.,
J. H. MACKIE,
General Secretary.

The Hon. the Minister for Agriculture, Wellington.

REPORT OF SPECIAL COMMITTEE APPOINTED TO WATCH EXPERIMENTS MADE FOR DESTROYING THE CODLIN-MOTH.

Otahuhu Orchard.

Auckland, 18th June, 1903.

I BEG to submit herewith report of the committee appointed to watch experiments *re* spraying, for suppression of the codlin-moth, carried out during the season 1902–3 by the Agricultural Department at Otahuhu. The committee paid several visits during the season.

The spraying-work done under the supervision of Mr. W. A. Boucher began on the 11th November, when the Red Astrachans were sprayed. This variety was sprayed four times altogether, the last spraying being on the 21st December. The Cox's Orange Pippin trees were sprayed five times in all; the first spraying being on the 21st November, and the last on the 6th March. Ohinemuri and Simmonds' Winter varieties were sprayed eight times in all; the first spraying being on the 11th November, and the last on the 6th April.

The only formula used for the spraying-mixture this season was—White arsenic, 1 lb.; washing-soda, 2 lbs.; lime-water (saturated), 700 gallons. The spray nozzle used was one throwing not too fine a spray, as it is found that with the fine-spray nozzles the spraying-mixture cannot be thrown with sufficient force to reach the interstices of the clusters of fruit, just where the eggs of the codlin-moth will often be laid.

At a visit of the committee on the 31st January the apples were all pulled from a selected Red Astrachan tree, with the following result: Clean fruit, 390; moth-infested, 10; total number, 400; percentage of infested fruit, 2½. Everywhere this season this variety has suffered comparatively little from the attacks of the codlin-moth. The committee at this visit found all the trees healthy, and showing little signs of scorched foliage from the effects of the spraying, only one tree being slightly affected. The leaf-roller pest and the bronze beetle were not much in evidence. The season for fruit was about three weeks later than usual this past season.

The committee paid their next visit to the orchard on the 7th March, when two Cox's Orange trees were stripped of fruit for testing purposes, with the following result: No. 1 tree—Clean fruit, 814; moth-infested, 94; total number, 908; percentage of infested fruit, 10⅓. No. 2 tree—Clean fruit, 650; moth-infested, 53; total number, 703; percentage of infested fruit, 7½. No. 1 tree in this test was outside the enclosure where pigs were running, while No. 2 tree was inside the enclosure. In the latter case, as the figures show, the amount of infested fruit on the tree was nearly 3 per cent. less than in the case of No. 1 tree, which had not the assistance of the pigs to devour the fallen fruit. The fallen fruit from sixteen Cox's Orange trees was also gathered up and examined for codlin-moth, with the following result: Clean fruit, 4,013; moth-infested, 1,251; total number, 5,264 fallen apples; percentage of infested fruit, 23½.

Another visit was paid by the committee on the 21st April, when the fruit of two trees was gathered and examined, one being an Ohinemuri and the other a Simmonds' Winter, with the following result: No. 1 Ohinemuri—Clean fruit, 526; moth-infested, 192; total number, 718; percentage of infested fruit, 26½. No. 2, Simmonds' Winter—Clean fruit, 186; moth-infested, 23; total number, 209; percentage of infested fruit, 11. . The result of the examination of the fallen fruit gathered off the ground in the case of these two varieties respectively was as follows: Ohinemuri trees—Clean fruit, 10,765; moth-infested, 6,606; total number, 17,371; percentage of infested fruit, 38. Simmonds' Winter trees—Clean fruit, 9,220; moth-infested, 4,685; total number, 13,905; percentage of infested fruit, 33⅓.

Taking the orchard on the whole there was a good average crop of fruit on the trees. No bands were used during the season, so that the spraying was the only means adopted for combating the moth, except in the portion of the orchard where pigs were kept.

The committee are of the opinion that it is very desirable to continue the experiments for at least another season, if not longer, in order to test the question of the possible injury to the trees from the spraying operations being continued for successive years, especially as, from some reason or other, the foliage on some of the trees looked far from healthy this year. To make the test a fair one, the committee have no objection to the application of a moderate dressing of manure to the trees, nor to any surface-cultivation which may be thought advisable. Another reason for continuing the experiments at the Otahuhu orchard for a longer period is that remedies against the woolly-aphis blight may be tried. Attempts to deal with this pest at the Henderson orchard by the application of pure kerosene resulted in no practical benefit. With regard to the leaf-roller and bronze-beetle pests, these were undoubtedly lessened by the spraying with arsenic in the Otahuhu orchard.

While the committee realise that the cost of the experiments at Otahuhu as carried out by the Department was necessarily higher than spraying operations would be when carried out by private orchardists after the best mixtures and methods had been ascertained and set forth by the Department, the committee nevertheless considers that the cost of these experiments should be stated as an approximate guide to fruitgrowers.

With regard to the Henderson orchard, which was also visited by the committee during the season, they wish to state that in their opinion nothing will be gained by continuing the experiments in this locality, where, owing to the nature of the soil, combined with exposure to strong bleak winds, the original idea of showing what might be done in fruit-growing in the district generally cannot be carried out with any prospect of success. The committee therefore recommend that no further experimental work be carried on in this particular spot.

The committee wish to state that Mr. Boucher has done his best at Henderson, and greatly improved the conditions by the cultivating and other work he has done there; but the practical results are not likely to be commensurate with the cost.

GERALD L. PEACOCKE,
Chairman, Visiting Committee.

QUESTIONS SUBMITTED BY MR. MASSEY, AND ANSWERS BY THE GOVERNMENT POMOLOGIST, W. A. BOUCHER.

BEFORE answering the questions submitted, which I understand are intended to apply only to the Otahuhu orchard placed under my charge, subject to reports from time to time by a committee composed principally of Auckland fruit-growers, I must explain, in justice to the Department and myself, the history of the orchard prior to the time operations were commenced.

For some years after planting every care was given to the trees, which, surrounded by a close shelter-belt of *Pinus insignis* and *macrocarpa*, made rapid growth. It was only when season after season the fruit produced was rendered unsaleable by codlin-moth that the owner became discouraged. A long period of neglect followed, the orchard being eventually let to a tenant, who, finding no profit from the fruit, allowed his cattle the run of the orchard, with the natural result that many of the lower limbs of the trees were so much damaged as to necessitate their removal. Later the property was sold to the present owner, Mr. F. Lippiatt, who attached so little value to the trees that he had commenced to take them out.

When the question of the Department taking over an orchard for spraying for the codlin-moth was prominently brought forward, this property was suggested as being most suitable, partly on account of the fact that it was practically impossible to find any place that was in worse condition generally—the trees being infested with scale, woolly aphis, mealy bug, and codlin-moth, and the fruit with scab (*Fusicladium dendriticum*), the limbs of the trees being also covered with moss and lichen—and partly on account of previous efforts having failed to place and keep the orchard in satisfactory condition.

After this preliminary description it will be readily understood that, with trees denuded of many of their lower limbs, the cost of all orchard operations has been enormously increased. The fruit is almost all out of reach for gathering except with a ladder, increasing to a very considerable extent the cost of handling the fruit. The spread and height of the trees—which no system of pruning could reduce without the sacrifice of the crop for two or three seasons, which would not be advisable, seeing that the orchard was taken in hand solely for spraying against the moth—increases the cost of material for spraying, and time and labour in effecting it. Although the cost is stated in reply to question 7, it would be absurd to apply this as a general rule; for, in any orchard that has been well pruned annually from the time of planting, twice or even two and a half times as much could be accomplished at the same expense.

The labour question has been another serious consideration, for the size of the orchard does not justify the engagement of a permanent qualified man, and I have been obliged to rely upon untrained assistance. It is hardly necessary to point out that untrained help, however reliable and willing, cannot accomplish as much in a given time as after a period of training and practice.

For these reasons the expenses of working at Otahuhu cannot be taken as a fair criterion of what could be accomplished under more favourable conditions.

Mr. Massey's Questions.

1. The varieties of apples treated, and number of each variety?—Cox's Orange, Ohinemuri, Pride of Australia, and Simmonds' Winter, also Red Astrachan. The number of trees of each variety I am unable to give from memory. Will furnish later.

2. The spray mixtures used, and number and variety of trees each one was applied to?—Season 1901–2: Paris green, arsenic and soda (two formulæ), arseniate of lead. Particulars of cost and method of preparation are fully described on pages 427 and 428 of the Report of the Division of Biology and Horticulture, 1901–2, as follows:—

SPRAYING FOR THE CODLIN-MOTH.

In order to set at rest all controversy regarding the value of different arsenical washes for the codlin-moth, I decided to test several during the same season and under the same general conditions on adjoining rows of trees, so that the cost of each, its value as an insecticide, and the injurious action (if any) on the foliage might be noted and compared. The following arsenical sprays were tested:—

Paris Green.

1 lb. to 200 gallons saturated solution of lime-water.
Cost.—Paris green, 1s.; lime, 5d.: total cost per 200 gallons, 1s. 5d.

Arsenic and Soda No. 1.

1 lb. white arsenic, 2 lbs. washing-soda, to 700 gallons of lime-water.
Cost.—Arsenic, 6d.; washing-soda, 2d.; lime, 1s. 5½d.: total cost per 700 gallons, 2s. 1½d.

Arsenic and Soda No. 2.

1 lb. white arsenic, 4 lbs. washing-soda, to 400 gallons of lime-water.
Cost.—Arsenic, 6d.; washing-soda, 4d.: lime, 10d.: total cost per 400 gallons, 1s. 8d.

Arseniate of Lead.

1 lb. arseniate of lead, 1½ lbs. treacle, to 12 gallons of plain water.
Cost.—Arseniate of lead, 1s.; treacle, 1½d.: total cost per 12 gallons, 1s. 1½d.

Resin Mixture.

1 lb. washing-soda, 1½ lbs. resin.
Cost.—Washing-soda, 1d.; resin, 4½d.: total cost per 80 gallons, 5½d.

Paris Green.—In preparing the Paris green spray, in the proportion of 1 lb. Paris green to 200 gallons of lime-water, 2 oz. of Paris green will be carefully weighed for each 25 gallons of water. Proportions arranged by guess-work are not satisfactory, and may be attended by very injurious results. Prepare a saturated solution of lime-water, weigh out 2 oz. of Paris green and about the same quantity of lime, mix together dry, add water sufficient to make a stiff paste, mix thoroughly, and add to the saturated solution of lime-water, which will then be ready for use. An efficient agitator in the liquid is absolutely necessary, as the Paris green settles rapidly, so that a considerable quantity may be discharged from the pump upon a single tree with disastrous results. On account of the frequent showers that fall in the spring and early summer in the Auckland District, I have added to each 18 gallons of the above half a gallon of resin-solution, prepared by adding 1½ lbs. of resin to 2 gallons of boiling water in which 1 lb. washing-soda has been dissolved, and boiling until the resin is thoroughly dissolved. Observing these proportions, a

quantity of this solution may be prepared in anticipation of the busy season, and drawn upon when necessary. The addition of the resin-solution to the Paris green can be recommended, particularly during the early part of the season, when showers are frequent, as it renders the Paris green more adhesive, and not only so, but by increasing the density of the liquid the Paris green settles less readily, and is, in fact, almost held in suspension, being thus distributed more evenly over each tree. The Paris green and resin solution proved absolutely effective in preventing the attacks of the bronze beetle, which in some localities are almost as much to be dreaded as the codlin-moth.

Arsenic and Soda No. 1.—It will be necessary to advise those who prefer this solution to exercise care both in preparation and proportioning. Prepare by adding 1 lbs. white arsenic to 2 gallons of water in which 2 lbs. washing-soda has been dissolved, and boil until arsenic is thoroughly dissolved. As this will produce a liquid almost like clear water, it is advisable to use some simple colouring-matter to prevent mistakes. In bottling for use a graduated glass should be used, so that the number of fluid ounces may be determined in order to be able to proportion the solution evenly through any number of gallons of water, for, as the solution may after boiling be in a highly concentrated form, the addition of a single fluid ounce over and above the proper amount to, say, 18 gallons of water, might have decidedly injurious results. This solution was used in the proportion of 1 lb. arsenic to 700 gallons of saturated solution of lime-water.

Arsenic and Soda No. 2.—This preparation was suggested by Mr. Hanlon on his return from a visit to Europe and the United States of America, as being largely used by apple-growers in the Eastern States of America. After careful testing I found that the action upon the foliage of the Cox's Orange apples was rather severe when used in proportion of 1 lb. arsenic to 400 gallons of water. I therefore reduced the proportion to 1 lb. arsenic to 600 gallons of water, which proved effective without injury.

Arseniate of Lead.—This preparation, which can be purchased ready-prepared, is convenient to handle, can be used freely (if properly proportioned) without fear of injurious results, and has proved effective, but the cost is so considerable that, for commercial orchards, I fear it is out of the question unless the price can be much reduced.

Season 1902–3: Arsenic and soda—1 lb. arsenic, 2 lbs. washing-soda, to 700 gallons of saturated solution of lime-water. The number of trees of each variety I am unable to give from memory.

3. The dates when the first applications were made in each season, and the number of applications from that date till the apples were harvested?—Season 1901–2: Red Astrachan, last week in October; Ohinemuri, Pride of Australia, Simmonds' Winter, and Cox's Orange, from the 6th November to the 14th November, as the weather permitted. Red Astrachans were sprayed four times; Cox's Orange, six times; and the later varieties—Ohinemuri, Pride of Australia, and Simmonds' Winter—eight times. Season 1902–3: Spraying commenced on the 11th November. Red Astrachans were sprayed four times; Cox's Orange, five times; Ohinemuri, Pride of Australia, and Simmonds' Winter, eight times.

4. Other means taken to trap and destroy grubs which escaped destruction by spraying?—Season 1901–2: Bands of sacking were used; pigs also having the run of the orchard, to save expense of gathering up fallen fruit by hand. Season 1902–3: In deference to the wishes of the committee, and to test their value in assisting to subdue the moth, pigs were kept on one section of the orchard only. No bands were used in any part of the orchard, spraying alone being relied upon.

5. Spraying apparatus used?—The "Pluvial," a powerful force-pump manufactured by Messrs. Burt and Co., of Dunedin. This pump is similar to the well-known Californian "Bean" spray.

6. Ease or otherwise of application of various sprays used?—Arseniate of lead is perhaps the safest and most convenient to use, but, unfortunately, very expensive. Paris green has not proved sufficiently reliable, some brands containing too large a percentage of free arsenious acid. Apart from the trouble of preparing, the arsenic-and-soda spray is convenient and economical, but must be used with care.

7. Cost of spraying-mixtures and their application at per acre containing 100 trees of this age (about eighteen years old)?—Paris green, 1s. 5d. per 200 gallons; arsenic and soda, 2s. 1½d. per 700 gallons; arseniate of lead, 1s. 1½d. per 12 gallons of spray. Cost per acre, Paris green: Labour, 10s.; material, 8½d.; total cost per acre, 10s. 8½d. Cost per acre, arsenic and soda: Labour, 10s.; material, 3½d.; total cost per acre, 10s. 3½d. Cost per acre, arseniate of lead: Labour, 10s.; material, 8s. 4d.; total cost per acre, 18s. 4d. For the coming season arseniate of lead will be imported at about one-fourth of the price noted above. I also propose to test a brand of Paris green, introduced from California, manufactured specially for spraying purposes, giving by analysis a very low percentage of free arsenious acid, which, if present in large quantities, causes injurious effects on the foliage. The above cost for labour might be reduced by using two leads of hose, and still more by using four leads, taking four rows of trees at a time. Moreover, an orchard where the trees had been systematically pruned would take less than one-half the time and liquid that the overgrown trees in the Otahuhu orchard have done, and yet give the same yield of fruit.

8. Has the ground been kept clean under the trees treated?—The orchard has been divided into two sections, one section being cultivated, and the other left in its natural state. The foliage of the trees on the cultivated section presented last season a much more healthy appearance than that of the trees on the uncultivated land.

9. Relative effective values of the spraying-mixtures used, with their degree of injurious effect on the foliage, bark, and buds of the trees they were applied to?—The results of spraying with arseniate of lead and arsenic and soda, in the percentage of sound fruit saved, are much the same. Arseniate of lead is very expensive; but, if properly proportioned in the manufacture, perfectly safe to use, no injurious results being noticeable. Arsenic and soda must be used with care, must be properly proportioned, and mixed with a saturated solution of lime-water from perfectly fresh stone lime. This mixture, at the Otahuhu orchard, season 1901–2, saved 95 per cent. of Simmonds' Winter from the moth. Paris green: Trees sprayed at Otahuhu with Paris green yielded a fraction over 90 per cent. free from the moth. The great drawback to the use of Paris green has been in the different brands showing varying percentages of arsenious acid, so that in some instances the injurious effect is little or nil, in others the scorching of the foliage is very severe. The "Horticultural Brand" introduced by the Department will, I hope, do away with this objection.

10. Cost incurred for treating each variety with mixture used, and for picking, packing, and marketing?—No record of the cost of each variety has been kept, as the orchard is a mixed one, and was taken in hand especially for spraying for codlin-moth, the varieties in some instances being mixed in the rows. As far as I can judge without actual figures the average cost of trees throughout would be about the same, as trees of each variety vary in height and spread. Cost incurred for treating each variety, based on a hundred trees per acre, has already been given.

11. Estimated cost per acre containing a hundred trees, based on actual cost incurred for each variety, including cost of operations, picking, packing, and marketing fruit?—It would be a difficult matter to estimate the cost per acre for other orchards, as it would vary with each individual place according to the appliances available for spraying and the height and spread of the trees, which are most important factors in estimating the expense both of spraying and marketing, which would include the cost of picking. In this, New Zealand orchards differ essentially from those of California, where practically a uniform system of pruning has been observed. With uniform trees, uniformity in the cost of orchard operations is assured.

12. Receipts for fruit of each variety?—Although account sales for each variety have not been kept separate, I will endeavour to furnish this return as soon as I can procure the necessary figures.

13. Estimated receipts per acre containing a hundred trees, based on actual receipts from each variety?—If this question applies to orchards generally, and northern orchards in particular, I can only say that, with the present fluctuation of prices throughout the season and from season to season, the results are so speculative that it is impossible to give any reliable estimate. Varieties of apples that realised high prices last season, when fruit generally was scarce, may be worth little or nothing next season if fruit is plentiful. This unfortunate state of affairs will probably continue until, either with or without compulsion, a united effort is made to control the moth, and so produce a sufficient quantity of sound fruit to initiate an export trade and relieve the local markets. The codlin-moth has been a most troublesome pest in the North for many years. How much has been done without compulsion to control it, and what is there to prevent it spreading, or, rather, being carried in infected fruit, to districts which are now free? In this connection, I trust Parliament will this session pass a Bill to enable the Agricultural Department to advance funds to assist such enterprises as the Cheviot Fruit-growers' Association, Motueka Co-operative Preserving Company, Hawke's Bay, and Auckland Fruit-growers—companies formed for the distribution of fruit locally, and the canning, pulping, and making into jam of surplus fruits of suitable varieties that now simply serve to glut the local market and bring about the speculative aspect of fruit-culture already mentioned, which results in such a glaring fluctuation of values that a reliable estimate of the returns per acre of an orchard for one season, or even an average for a number of seasons, could not be furnished.

14. Percentage of sound fruit to total amount of fruit of each variety picked from trees at the time of harvesting crop?—Season 1901–2: Red Astrachans, practically free from codlin-moth; Cox's Orange, 89 and a fraction per cent. sound; Ohinemuri, a fraction over 90 per cent. sound; Simmonds' Winter, a fraction over 95 per cent. sound. Season 1902–3: Red Astrachan, 97½ per cent. sound; Cox's Orange, from 89¾ to 92½ per cent. sound; Simmonds' Winter, 89 per cent. sound. The above figures are according to the count made by a committee of Auckland fruit-growers appointed by the Department to report from time to time on the progress of operations. The count was made on the outward appearance of the fruit, and in many cases apples marked by the grub of the codlin-moth in its attempt to penetrate the fruit before being destroyed by the poison were condemned, though not actually infected. On the occasion of each visit of the committee a tree was selected by themselves, all the fruit gathered, and the count made, including such windfalls as were lying under the tree at the time. If these figures err at all, they certainly err in making the percentage of sound fruit too low, owing to the fruit being condemned on the outward appearance, and not by actual examination.

Remarks.

The precise bearing of these questions on the Orchard and Garden Pests Bill, except to be in favour of passing it, I do not quite see. It has been proved that it is feasible to control the codlin-moth by spraying, and this was the real object for which the spraying was undertaken. The example has been offered to growers, and full instructions given and followed by growers successfully in many instances, but the option is left to follow the example, or adopt other means, such as bandages, to control the moth.

The commercial aspect of the question depends solely on the prices to be realised in the markets. Prices rise to a satisfactory figure, or fall in such an alarming manner, according as the supply of fruit is short or excessive. The regulation of market rates will only be accomplished by an export trade; and an export trade cannot be attempted until there is a sufficient quantity of sound fruit to keep up regular shipments. A sufficient quantity of sound fruit for export will not be obtained until a united effort is made to control the codlin-moth; and a united effort is not likely to be made without such compulsion as may be brought to bear by the passing of the Orchard and Garden Pests Bill, which, as already stated, leaves it optional with each grower to adopt the method of suppression he prefers — whether by spraying or bandaging, or both — so that primarily the commercial aspect, as far as the North is concerned, depends upon the passing of this Bill to insure the production of a greater quantity of sound fruit.

As an instance, some years ago when a trial shipment was proposed and the North asked to contribute its share, the reply was that the Auckland Province was not prepared to supply 500 cases; and when the season before last the matter was again under discussion, Canterbury and Otago promised to contribute 7,000 cases of apples, but the Auckland Fruitgrowers' Union replied, through its secretary, that it was not prepared to promise 1,000 cases—this in spite of the fact that Auckland returned 10,770 acres as under orchard, against 8,873 for the whole of the South Island. This is largely accounted for by the prevalence of the moth in the North.

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