

1883.

NEW ZEALAND.

BOTANIC GARDEN BOARD, 1882-83

(FOURTEENTH ANNUAL REPORT OF).

Presented to both Houses of the General Assembly by Command of His Excellency.

THE Board held meetings on the 8th August and the 25th October, 1882; and on the 15th July and the 20th March, 1883.

The members of the Board for the past year were as follow: His Excellency Sir W. F. D. Jervis, K.G.C.M.G., C.B., Governor; Hon. Thomas Dick, Colonial Secretary; Hon. W. B. D. Mantell, M.L.C., F.R.G.S.; W. T. L. Travers, F.L.S.; Dr. Hector, C.M.G., F.R.S.; Ven. Archdeacon Stock, B.A.; Thomas Mason, M.H.R.; Hon. G. Randall Johnson, M.L.C.; Hon. William Rolleston, Minister of Lands; James McKerrow, F.R.G.S., Surveyor-General; and Martin Chapman, Esq.

The expenditure for labour has been chiefly for the ordinary routine work, such as chaining and reforming paths and shubberies, repairing bridges, the extension of plantations, and the raising of forest trees in the nursery-ground for distribution.

Exceptional expenditure has been incurred for clearing about ten acres of gorse, which had spread from an adjacent property. This ground is now being prepared for sowing with seed of the golden wattle, an experiment of some interest, as, if it is found that the wattles can restrain the regrowth of the gorse, the produce of the wattle-bark will more than cover the cost of clearing large areas of country which are at present overgrown with gorse, and are not only unprofitable, but also constitute a source of danger and loss to the agriculturist by affording harbour for rabbits and other vermin. The preparation of ground for the experimental cultivation of medicinal and other economic plants is now completed, and a valuable selection of seeds and plants has been obtained for stocking it this season.

The expense of this work, and also the rearing of trees and the improvement of the nursery-grounds, has been defrayed from the special grant made to the Board by the Minister of Lands. The total number of forest trees raised from seed and otherwise added to the collections during the past season is 17,752, and about one-third of that number has been available for distribution. Young trees have been already distributed during the present season to the number of 2,714, the greater proportions of which have been given for planting public reserves. A small collection of American tree seeds was imported this season by Government, and has been distributed as usual throughout the colony; but the great success which has attended an experimental sowing of seed of *Cupressus microcarpa* obtained from trees now fruiting in the garden proves that it will be only necessary for the future to import the rarer species.

Advantage was also taken of the assistance of the Hon. G. Randall Johnson to procure in Australia the best quality of seeds for the cultivation of wattle-bark, and also samples of the seeds of various gum trees, and a large quantity of the seed of the true blue-gum. This latter seed is chiefly for the use of the Railway Department, which has organized extensive nurseries in both Islands, from which it is intended to plant the railway reserves and to renew the fences.

The golden wattle (*Acacia pycnantha*) is the species recommended for cultivation in New Zealand, and grows with greater vigour than in Australia; seeds of this species, sown last September, over areas of many acres in extent in the Wellington District, having produced plants that are already three feet high.

Unfortunately, a very destructive scale blight has appeared in Nelson this year, which completely destroys not only the wattle-trees, but is also spreading to all kinds of pine and fruit trees. Some interesting notes on this blight are appended to this report (Appendix II.).

The trees that were obtained from Japan last year nearly all recovered, and are now thriving well. Some of the dwarf oranges that were removed to Auckland have borne fruit this season.

The sorghum experiments have not been continued in the gardens, but were continued in the northern part of the colony, and the results collected by this department are very favourable, proving that quite as large a percentage of crystallizable sugar can be obtained in this country as in America. Recent improvements have been made in the machinery, and by the use of a vacuum evaporating pan all the causes of the former miscarriage in the production of the sugar appear to have been removed, so that there is every prospect of the growth of sorghum becoming an important industry in the North of New Zealand.

A most interesting and important feature of the year has been the sudden expansion of the cultivation of hops in the colony, concerning which some particulars will be found in Appendix III.

TOTAL EXPENSES ON GARDENS, 1869-82 (Thirteen Years).

EXPENSES ON RECREATION-GROUNDS.			REVENUE FROM LOCAL SOURCES.		
	£	s. d.		£	s. d.
Half of fencing	178	8 9	Trustees	410	15 5
Half of planting (holes, seeds)	204	16 4½	Provincial Council grant	600	0 0
Paths	103	11 4	City reserves	1,297	16 5
Seats	47	1 4	Wellington Philosophical Society grant	50	0 0
Half of buildings	190	15 3½	Sale of hay	221	0 6
One-third of labour	1,264	2 7	Sale of sheep	13	15 0
Half of miscellaneous	129	15 10½	Trespass	1	0 0
Total	£2,118	11 6½	Total	£2,594	7 4

Experimental Cultivation and Distribution of Trees and Shrubs throughout the Colony.

EXPENSES.			REVENUE FROM COLONIAL SOURCES.		
	£	s. d.		£	s. d.
Half of planting	204	16 4	Votes by Parliament	2,800	0 0
Nursery	134	13 8	Grants to Flax Commissioners	50	0 0
Half of fencing	178	8 9	Government, 1881	121	10 4
Half of buildings	190	15 3½	Sale of plants	343	1 0
Two-thirds of labour	2,528	5 2			
Government, 1881	121	10 4			
Half of miscellaneous	129	15 10½			
Total	3,488	5 5½	Total	3,814	11 4
Total expenses, thirteen years (as above)	2,118	11 6½	Total revenue, thirteen years (as above)	2,594	7 4
Total expenditure	5,606	17 0			
Balance in hand, 8th August, 1882	302	1 8			
	£5,908	18 8	Total revenue	£5,908	18 8

APPENDIX II.

The WATTLE BLIGHT (*Icerya Purchasi*), Maskell.

THIS blight, recently introduced to New Zealand, is likely to prove destructive to many of our introduced shrubs and trees if not attended to. It was first noticed in the vicinity of Auckland in 1878 by Messrs. Purchas and Cheeseman on the kangaroo acacia, and specimens were sent at that time to Mr. Maskell, of Christchurch, who determined its position in *Icerya*,* a genus of the Coccidæ, of which previously only one species was known (*Icerya sacchari*), a scale insect of the Mauritius, which is very destructive in that colony to the sugar-cane.

The New Zealand insect, according to Mr. Maskell, differs sufficiently from the Mauritius insect to require a distinctive name, as, no doubt, these lower forms of life possess a large power of adaptive change in structure to the influence of sudden change in food or climate.

The tannic juices of the acacia plants first selected by this insect on its arrival in New Zealand must have presented a remarkable contrast to the sweet juice of the sugar-cane, to which it had been previously accustomed in the Mauritius, and such a violent change of food would, no doubt, account for some change in its form. In this case, however, the theory must be based on the assumption that it arrived from the Mauritius, but it is more probable that the insect arrived from Australia, where the genus acacia is abundant, and where the insect may also be common. And this will account for its preference of the acacia plants as food in New Zealand, although at the same time it shows symptoms of being omnivorous.

It is evident that this insect will not limit its ravages to the acacia family of plants, as it has in one case, in Mr. Engle's garden, Nelson, attacked every fruit-bearing tree and shrub there. It is apparent also that the insect has no particular season of increase, but continues propagating during the whole year. In proof of this it was noticed that during several days of wet warm weather in the middle of winter they hatched out during every blink of sunshine, and the progress of their growth was uninterrupted, as proved by the presence of insects in every stage of growth. The newly-hatched young run along the branches with remarkable speed, and, the males also being winged, may account for their rapid dispersion. That something may be done to remedy this evil when it attacks fruit crops is undoubted, as the energy of Mr. Engle proves. This gentleman, who possesses a valuable collection of fruit trees and bushes, including oranges, lemons, apples, pears, plums, peaches, and various currants, on finding his garden overrun by the pest, had the whole of his plants dressed with fish-oil and kerosene, and with complete success in the total destruction of the blight.

This *Icerya* blight has not, as far as at present known, been seen in Wellington, but, from its having already reached Auckland, Nelson, and Napier, it may soon pay Wellington an unwelcome visit.

The foregoing, it occurs to me, may be supplemented by a little further information on the subject of these pests, which seem not unlikely to do much damage.

The following information on this important subject has been given by Mr. W. M. Maskell:—

"Gardeners are, I think, as a rule, somewhat too careless in this country, or I should perhaps say, know too little about the outdoor scale insects. Generally speaking, these insects in England are confined to greenhouses or hothouses, where they have not the time nor the power to spread

* Trans. N.Z. Instit., XI., p. 220, plate VIII.

greatly, either because the gardener looks after them pretty closely, or because the plants are constantly being shifted, sold off, or allowed to die and be replaced by others. Out of doors I imagine that the cold of winter is too much for them; at all events, they are by no means common, nor do they do much harm. Only by knowing where to look for them, and by the exercise of some patience, could any number of them be collected; and so gardeners have come to care only for the two or three commoner greenhouse species. But in warmer countries, such as the South of France, or Italy, or Spain, the outdoor Coccidæ are enormously injurious; for example, amongst the olive and orange trees, and myrtles, and immense losses result from their ravages. The same may be said of California and the warmer States of the Atlantic, and the same is the case in this country, where there is no winter (generally) severe enough to kill them off. I have known very many instances of complete ruin to valuable trees and shrubs out of doors from scale insects indigenous to the country, but not noticed much by gardeners because they are not like what were known in England. Two examples occur to me just at this moment, though the plants in these instances were not of especial value. In one case all the calceolarias and kindred plants in the Christchurch Public Gardens were quite destroyed by a native coccid, one of the mealy bug tribe, coming from *Phormium* growing in the vicinity; again, *Cordylone australis* and *C. indivisa* are being rapidly ruined, and many have had to be burnt, from the attacks of a small native scale, allied to the apple scale. I have been surprised to find how many gardeners take no note of these outdoor insects, and how many trees have been destroyed in consequence.

“Entomological and horticultural books pass over the scale insects very lightly, partly because of the carelessness just mentioned, partly because of the rarity of the pests in England. But people in warm countries have to be more careful, and so shall we in New Zealand, where the insects spread so rapidly. I venture to quote a few sentences from a report on scale insects by Mr. J. H. Comstock, State Entomologist at Washington. Speaking of the methods of preventing the spread of the insects, he says: ‘The fact that trees or scions appear free from pests should not deter one from using the utmost precaution, for the untrained eye would fail to detect the early stages of these insects. Do not visit infested orchards unnecessarily, and, above all things, do not carry home specimens of scale insects as curiosities. The trees should be watched carefully, and if one is ever found to be infested with scale insects it should be destroyed at once. Remember that no better investment can be made than to burn such a tree, and that no other time is so good for doing it as the day it is first found to be infested.’ Mr. Comstock speaks from long experience, and his remarks deserve great attention; and the milder the climate of a place the more care should be exercised.

“Now, there are two different insects on the specimens of wattle sent to me by Dr. Hector. The one very numerous lies close on the bark, covered over with a little hard shell or case, somewhat of the shape of a mussel, and the colour of the bark—indeed, the case is largely made up of vegetable matter. This is certainly nearly allied to the common apple scale, *Mytilaspis pomorum*, which may be seen here in Christchurch in countless millions, covering apple, thorn, pear, plum, peach, and many other deciduous trees. I do not doubt that on a single piece of branch, say, a foot long and an inch thick, there may sometimes be found several thousands of the little shells, and, as each insect is provided with a sharp boring instrument, and sucks away pretty vigorously at the branch, it stands to reason that the tree must suffer enormously. The little scale on the wattle is almost, if not quite, the same insect; I have been unable to decide with certainty, as happily every shell on the branch sent had been bored by a parasitic fly, and the inmate consequently killed. The immense number of parasites on this particular family of the scale insect is indeed one great help against their ravages; and as the apple scale is peculiarly subject to parasites its work has doubtless been greatly checked. However, it still can do, and does, immense damage; and many remedies have been suggested, such as soap, alcohol, pyrethrum powder, ammonia, sulphur, kerosene (mixed or pure), and others. Of these, only two have been found useful, soap and kerosene; the rest are either harmful or do no good at all. It must be understood that in any case the remedy has to be applied by painting on the tree. Mr. Comstock, in the report mentioned above, has found an application of a quarter of a pound of soap to one gallon of water, painted on twice at intervals of a few days, very satisfactory. For my part, I have had experience of a mixture of one-third kerosene and two-thirds linseed oil, which has been perfectly successful, though perhaps the best proportion would be one-fourth kerosene. I do not mean to say that kerosene is not often injurious to plants; at the same time it has been ascertained in America that the leaves and young shoots of orange trees and twigs and leaves of ivy have been saturated with pure kerosene without any other result than the destruction of every scale insect on them.

“Nor do I overlook the question of cost; but this is and must be a matter for individual consideration. Anyhow, I have seen the application of kerosene and linseed oil so successful that no scale insect appeared on the trees for several years afterwards; and it is worth considering whether such a result would not compensate for some cost at first.

“Whether this little *Mytilaspis* will be very destructive to wattles, or not, I cannot say; on the whole I should not think so, as I remarked in my letter to Dr. Hector. The same cannot be said of the other insect, *Icerya Purchasi*. This is more dangerous for several reasons: for example, it is far more active than *Mytilaspis*, the young of which alone travel about (for, after the first stage of its life, *Mytilaspis* loses all its legs), whereas both young and adult of *Icerya* travel a good deal; also it attacks not only deciduous but also evergreen trees, and is thus much more difficult to get at; also it is scarcely, if at all, subject to parasites. In the matter of eggs, probably there is not a great difference between the two: *Mytilaspis* may lay thirty to fifty, and *Icerya* sixty to seventy; but the moment they are hatched the young *Icerya* will march off twenty times as far as, and much faster than, the young *Mytilaspis*.

“Painting of trees, whether with kerosene, soap, or anything else, is out of the question as regards *Icerya*, and no remedy that I am aware of is of use except the destruction of the tree. Once established, the pest will become a great scourge. When I first discovered it in this country, in 1878, it was on one single hedge of prickly acacia in Auckland, close to the parish church of Newton; the

hedge was perhaps ten yards long, and there may have been several thousands of insects on it, reducing it to a miserable state. I recommended the owner to destroy every plant; but this cannot have been done, for in 1881, three years afterwards, I found the insect in myriads on a large number of various trees (apples, roses, pines and cypresses, gorse, &c.) all over the deep valley from the Newton church down to the harbour (I believe they call it the Grafton Road), and in many other places round Auckland. Very soon afterwards complaints came to me from Napier that the insect was becoming a nuisance there; and some months ago Mr. Holloway, of the Bank of New Zealand, Nelson, sent me some twigs covered with *Icerya*.

“At the Cape of Good Hope this insect appeared a few years ago, and was there called the ‘Australian bug;’ and in a very short time its ravages became so great that the Government was obliged to take somewhat drastic measures for its extinction. In about 1878 it appeared in California, where also it was considered Australian; and Mr. Comstock informs me that the damage done by it to limes, oranges, pines, and other trees all along the Western Coast States has been enormous, and is every year increasing. This, as you will remark, in the short space of five or six years. It is not particular about its food. The acacia or wattle would seem to be its natural habitat, but it attacks readily every tree.

“I think that in all probability this pest has been brought to New Zealand, and has spread from Auckland to Nelson, chiefly by means of persons carrying about in steamers bunches of flowers, wattle branches, &c. I have no doubt it is Australian originally (its nearest cousin is in Mauritius), and it remains to be seen whether it will spread in our colder southern climate as it has in the north. But Nelson, I fancy, is warm enough to give it all the scope it can desire, and it will probably ere long be a most destructive pest there.

“I trust that your readers will pardon my inflicting on them this lengthy epistle, but the subject is one which will touch them somewhat closely. It may sound a harsh and disagreeable thing, but it is nevertheless most probable that the only way to get rid of *Icerya* is to ruthlessly destroy every plant infested with it. I cannot say whether it may not be already too late even for that.”

APPENDIX III.

ON HOP CULTIVATION IN WELLINGTON.

FROM experiments made in the Wellington Botanical Gardens during the last few years with the hop plant, it has been proved to grow well in this district; and, as the cultivation of this plant at the present time is exciting some interest, a few notes on the subject, based on the successful cultivation of that plant in Nelson, may be useful to intending cultivators in other parts of the colony. In Nelson the hop plant is cultivated on the same system as in England, and the admittedly fine crops of the former are greatly indebted to an unexhausted soil and fine climate. The hop plant delights in a deep, rich loam, mixed with calcareous sands, and, as the Nelson soils have these in abundance, hence the fine crops of that district.

In Nelson there are at least four varieties of the hop plant which are cultivated. They are propagated by cuttings taken in the spring from the first growth of the plant, the plant being annual, while the root is perennial. The plants, when harvested, are cut above the second or third lowest buds, which are close to the ground, as these produce the next year's crop, the latter throwing up shoots early in the spring, which are cleared off, then covered up, when the crown throws up new shoots, these are trained and tied to the poles. The plants are very prolific in buds and roots, which supply numerous layers for additional plantations. Three plants are generally placed in a hill, the hills being at a distance from one another of three feet, with the rows six feet apart. Sowing hop seed is not expedient, as plants grown from seed would prove inferior, although a new and superior variety might be found among some hundreds of seedlings, which would no doubt assist to extend the fame of New Zealand as a hop-growing country, and at the same time enrich the discoverer.

The hop plant, as is well known, is dioecious, having the male and female organs on separate plants. Hops, however, can be grown from the female plant alone, but in this case produce no seed. As seeded hops, however, weigh much heavier, it is judicious to plant a few males in every plantation to secure this result. In England about 60 to 100 bushels of picked hops are required for a cwt. of dried hops in the bags, but when there is plenty of heavy seed a bag will weigh about 2½ cwt., thus showing the profit produced by the presence of a few male plants.

The hop crop in Nelson is subject more or less to the red spider and what is called the plant louse, but they have not yet committed any great damage. The wide selection of hosts, however, by the *Icerya Purchasi*, or coccuss blight, which has recently arrived in Nelson, may, if it attacks the hop plant, prove a serious evil.

Hop Poles.

In Nelson the poles for training the plants prove an expensive item in hop cultivation. Those used are chiefly young plants of indigenous trees, such as *Leptospermum scoparium*, *L. ericoides*, *Aristotelia racemosa*, *Myrsine Urvillei*, *Fagus Solandri*, *Fagus fusca*; any stick, however, which is nearly straight is made to serve the purpose. They require for the main crops to be from twenty to thirty feet long, although shorter poles will do for young plants; *Myrsine* is said to be the most durable.

Slanting the poles on which the plants are trained might be recommended, even if requiring short forks to keep them up: By this method the height of the crop is reduced, thus offering less surface to the wind, while the plants would ripen sooner from the influence of the closer radiated heat from the earth, and they would also be much more convenient for training and tying.

A great necessity exists for growing poles of trees known as possessing durable wood, such as oak, ash, birch, and species of Eucalypti, the damage caused through rotten poles being very serious, more especially when the plants are in flower.

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