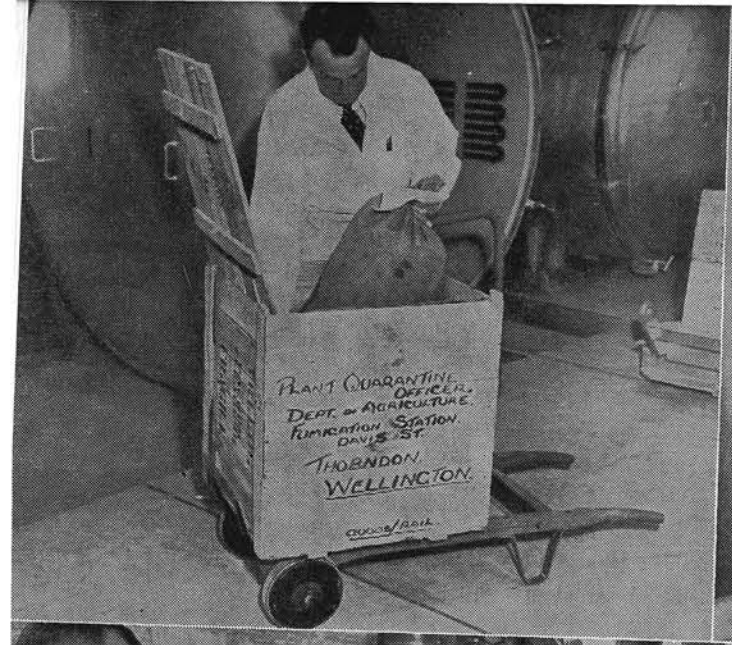
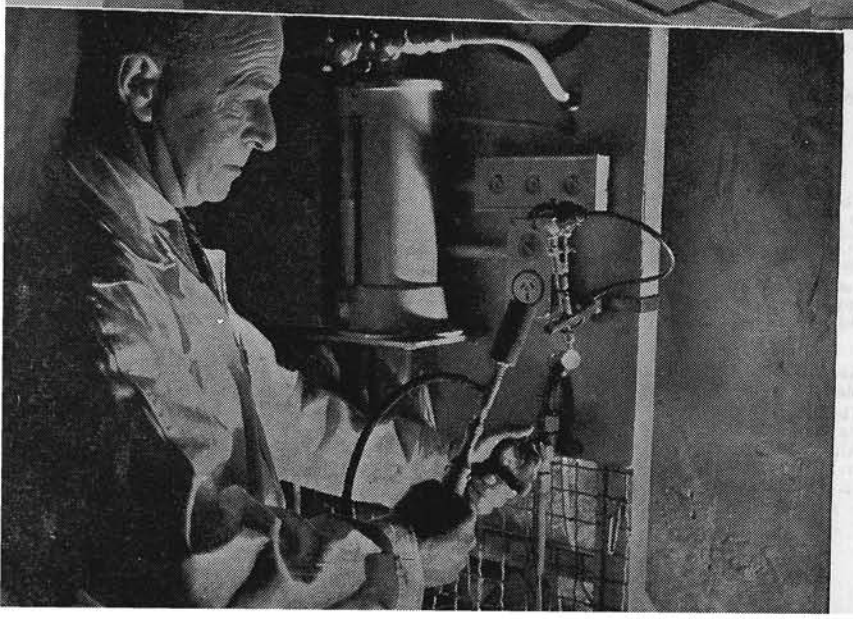
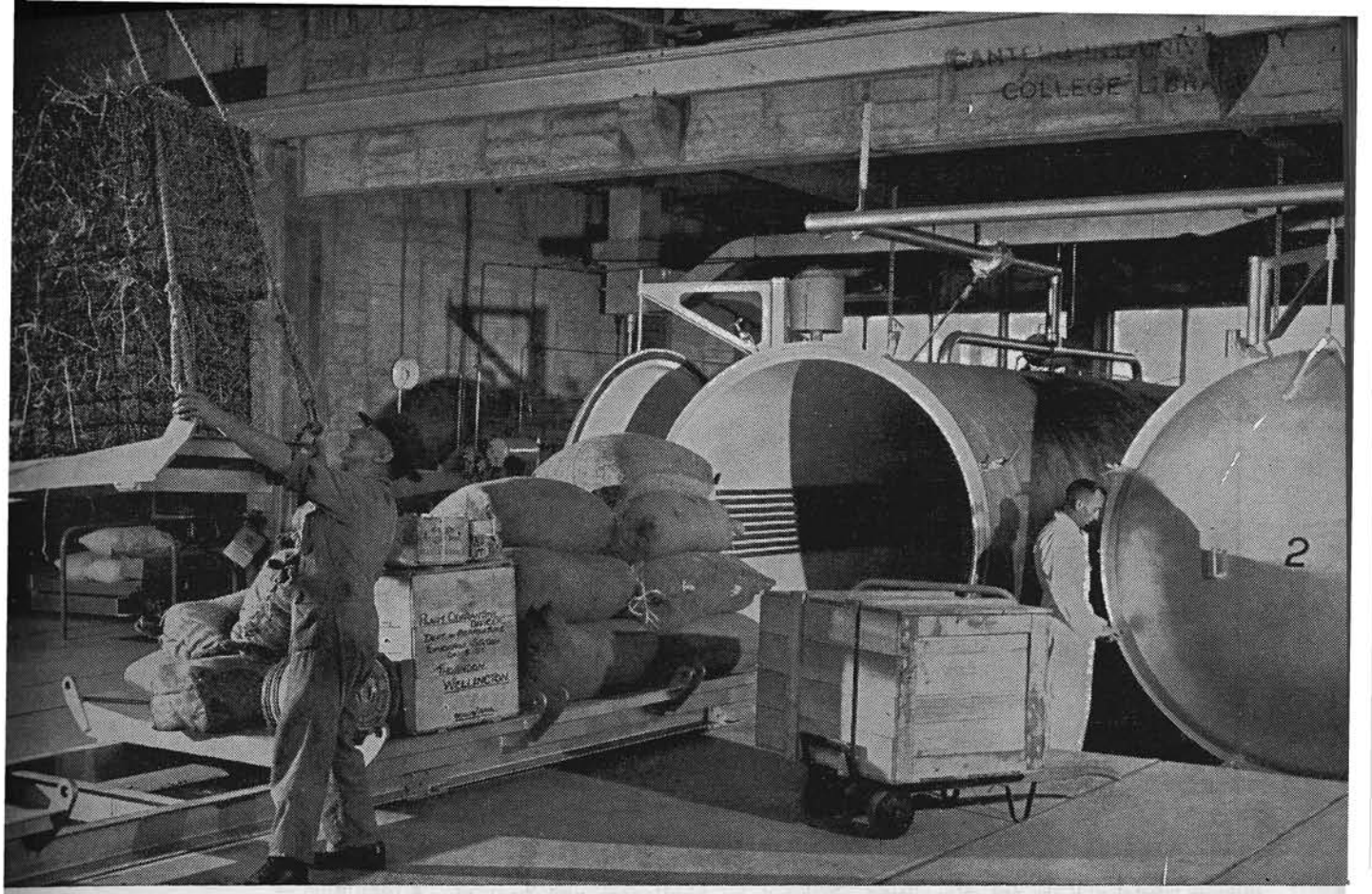
WELLINGTON'S NEW PLANT QUARANTINE STATION





The new Plant Quarantine Station recently opened in Wellington has the most up-to-date equipment possible to carry out the various important duties of the Service. Upper left—An officer unpacking a consignment sent in for fumigation. In the background are the two vacuum fumigation cylinders. Upper right—A charge of foodstuffs being placed in a vacuum fumigator for treatment with methyl bromide. Middle left—Second-hand sacking is placed in a small vacuum fumigation cylinder. Middle right—An operator wears protective clothing and a respirator while testing a bale of straw for presence of methyl bromide with a specially sensitive detector. Lower left—A specially sensitive gas detector is used to test a vacuum fumigation cylinder for presence of methyl bromide after fumigation has been completed. Inset—The Director-General of Agriculture, Mr. E. J. Fawcett, and the Minister of Agriculture, Mr. K. J. Holyoake, at the opening of the Station.

Inset photo. by Photo News.



Plant Quarantine in New Zealand since 1884

By G. A. H. HELSON, Research Superintendent, Horticulture Division, Department of Agriculture, Wellington

THE sole purpose of plant quarantine is to protect agricultural areas against the introduction and establishment of plant pests and diseases from which they are free. Many pests and diseases are more or less specific in their action; that is, they attack only certain groups of related host plants. Therefore, when a cultivated plant is introduced into a country where no near relatives occur, naturally it is likely to be fairly free from serious pests and diseases, the native insects and diseases being in a large measure unable to adapt themselves to such hosts. This desirable condition has not, as a rule, been maintained for any great length of time in any particular locality, for the reason that extensive commerce in nursery stock and other commodities on which pests and diseases may be carried has resulted in the introduction and establishment of many of them.

AS long ago as 1884 the New Zealand Government was aware of this danger of introducing pests and diseases on produce being imported into the Colony. Thus, before the formation of the Department of Agriculture, the Codling Moth Act 1884 had been passed under which the importation of codling moth into the Colony was prohibited. The Act, however, was not alone sufficient to prevent the eventual introduction of this pest, with the consequent recurring annual expense to fruit growers for its control ever since.

Early Quarantine Precautions

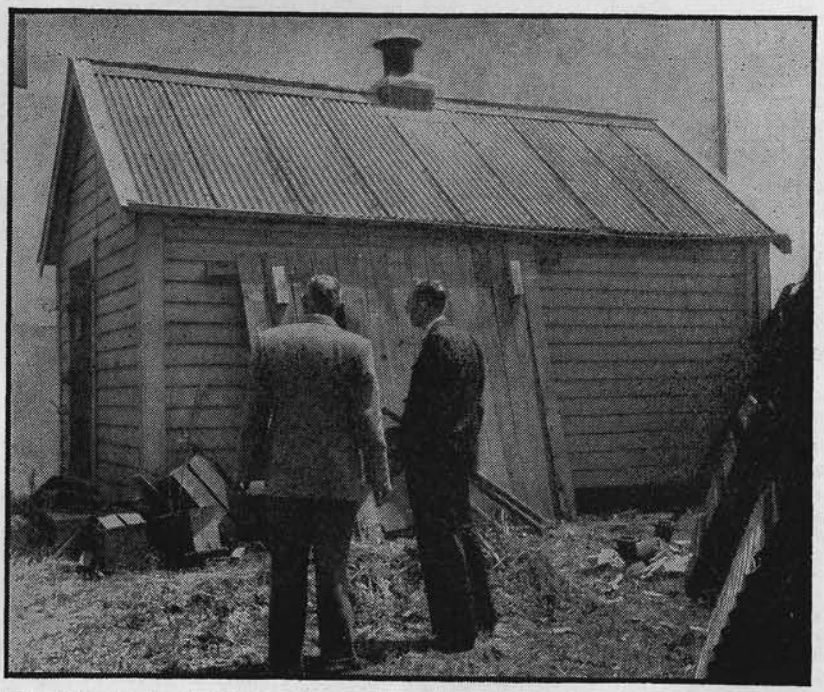
Ever since its inception in 1892 by the amalgamation of the Stock Department and the Agricultural Branch of the Lands and Survey Department the Department of Agriculture has been very conscious of the dangers of introducing harmful pests and diseases of plants and animals. Its first concern was to protect New Zealand's young and growing livestock industry, and it initiated a stock conference which was held in Wellington in October 1892. Delegates from Australia attended and comprehensive quarantine recommendations were drawn up. The wisdom of this early action is now apparent and New Zealand livestock remains to this day free from many of the world's most serious pests and diseases.

In 1893 T. W. Kirk was appointed Acting Biologist and founded the Horticulture Division following many complaints to the Department about insect pests and diseases of plants. His first task was to describe these and their life history and to prepare a number of leaflets on noxious weeds. By 1894 Kirk records that "A quantity of earth-ballast was placed on the reclaimed land; a few months later the heap was observed to be covered with a luxuriant growth of weeds . . ." He drew attention to the constant importation of plant pests and diseases and recommended as a remedy the "prohibition of the importation of all trees, plants, or fruit infected with any insect or fungoid pest".

Again in 1895 he repeated his warning and stressed it by saying:—

> I am now more strongly than ever convinced that the very first step necessary to enable us to combat successfully the ever-increasing army of orchard and crop pests is to prevent the importation of all seed, plants, fruit or other

HEADING PHOTOGRAPH: The great increase in the variety and quantity of products brought to New Zealand by fast transport makes essential the use of modern fumigation equipment such as the vacuum fumigation cylinders in the Plant Quarantine Service's new Station at Wellington. Here products are shown being prepared for fumigation with methyl bromide in one of the cylinders.



This old fumigation building in Wellington, in use from 1899 until recently, is unable to cope with the quantities of material now arriving from overseas and requiring fumigation.

packages infected with any pest or any insect or other organism, whether animal or vegetable, likely to become a pest.

At the present time our ports are open for the introduction of every abomination, with the single exception of codlin-moth, in the shape of weeds, and insect and fungus pests, which any unpatriotic colonist chooses to import—risking, for the sake of a small present profit, the future well-being not of himself only, but also the very existence of important industries and the people dependent thereon.

Kirk maintained that there should be proper supervision at the ports of entry and that all plants and fruit should be carefully examined, and, if diseased, disinfected at the expense of the importer or, if deemed advisable, totally destroyed with all packing. In his annual report for 1895 he set out in detail a proposal for a Proclamation entitled "Importation of Trees and Fruit infected with certain Insect and Fungus Pests Prohibited.—A Proclamation".

He reviewed the Regulations in force in California, British Columbia, and Australia.

Legislation

In 1895 a Bill entitled "An Act to prevent the Introduction and to provide for the Destruction of the Insect known as Phylloxera of Vines" was presented, but though it reached the second reading, time did not permit its consideration by Parliament and the Bill was not passed. The Orchard and Garden Pests Act was passed in 1896. In 1897 proclamations under this Act were gazetted prohibiting the importation of plants and fruits affected by any species of scale insect or by Queensland fruit flies. Vine cuttings infected by phylloxera and fruit attacked by codling moth were also prohibited. Inspection of all fruit and plants arriving in New Zealand was instituted at Auckland, Wellington, Lyttelton, and Dunedin. This was the first serious attempt to prevent the introduction of pests and diseases by an inspection staff centred at the main ports of entry of goods. The first inspectors to be appointed under this Proclamation were: Captain T. Broun, Auckland; W. J. Palmer, Auckland; J. Mayo, Wellington; and J. C. Blackmore, Christchurch. Of this Act Kirk wrote in 1899:—

"The present Act, though giving sufficient power to prevent the introduction of diseased fruit or plants from abroad, yet places absolutely no check on the sale or transit of such if locally grown", and pointed out that fruit infested with codling moth had on several occasions been seen in transit to localities where the insect was then unknown. He was concerned that this was enabling the insect to spread, evidence of which had "been amply verified by the experience of several southern districts during the last three years".

Fumigation Equipment

In 1899 fumigating sheds were erected at Auckland, Wellington, Christchurch, and Dunedin for treating scale infested consignments with hydrocyanic acid gas. Certificates were introduced for fruit from Australia stating that the consignments had been fumigated before export; when fruit arrived without such a certificate and examination revealed scale insects the consignment was fumigated. Thus facilities for the fumigation of imported plant material were not provided until 2 years after the adoption of inspection at the ports of entry. These fumigators have remained in use until the present day.

In 1900 Kirk wrote:—

"The Orchard and Garden Pests Act, 1896", gives power to deal with imported fruit, and so prevent the introduction of more pests, but, with the exception of the dreaded Phylloxera, or vine-louse, takes no notice of pests within the colony, and allows these to be disseminated at the will of any careless or unscrupulous colonist. . . . Unfortunately, the amending Bill introduced again last session did not become law, and codlin-moth-infested fruit may still be seen in transit into and through clean districts. . . .

The 1900 Bill is, with slight modifications, similar to that of last year, and provides a means of compelling dilatory owners, in the interest of their neighbours, to check or eradicate disease from amongst their trees.

Even at this time legislation was proposed to extend the scope of the 1896 Act. However, some Auckland orchardists opposed the Amendment and the Fruit-growers' Union passed a resolution:—

That the union, while expressing gratitude to the Government for taking over an orchard at Henderson for the purpose of experimenting with a view to the destruction of orchard pests, strongly urge that intended legislation be deferred until a specific be found that orchardists can use for controlling the said pests.

Some Nelson growers adopted the same resolution.

An extract from the annual report for 1901 states:—

All imported vegetation, whether fruit or plants, is subjected to the keenest scrutiny, and if any of the proclaimed diseases are present the consignments are dealt with according to law—i.e., fumigated, re-exported, or destroyed, according to the nature of the pest by which the line is attacked. A number of parcels have been destroyed, both at Auckland and Wellington, particularly the latter, on account of the presence of fruit-fly maggots. Surprise has been expressed at the few condemnations for maggot at Auckland, as com-

A Plant Quarantine Service officer examining imported peanuts on the wharf at Wellington.

pared with Wellington. It must, however, be remembered that, though by far the larger bulk of imported fruit enters at Auckland, it is principally from the islands. The greater proportion of Australian fruit, which carries both Queensland and Mediterranean fruit-fly maggots, comes to Wellington. Thus the matter is easily explained.

Thus it is evident that both Queensland and Mediterranean fruit flies were being intercepted in consignments of fruit arriving in New Zealand in 1900.

Fruit inspectors in 1902 were: Auckland, Captain T. Broun, assisted by Mr. G. Harnett; Wellington, Mr. H. Palethorpe; Christchurch, Mr. A. C. Smale; Dunedin, Mr. C. F. Cargill; Bluff, Captain J. W. Raymond, who was also Inspector of Stock.

The regular and systematic inspection of imported vegetation was carefully carried out by these inspectors as required by the "'Orchard and Garden Pests Act 1896'—Imported Fruit, Trees, and Plants".

A circular was issued for general information summarising the various regulations then in force. Briefly these were:—

1. (a) Fruit of any kind infested with fruit flies was prohibited; (b) Fruit infested with codling moth was destroyed or reshipped.

2. Fruit, plants, or trees infested with scale insects were admitted if certified to have been fumigated with hydrocyanic acid gas and the inspector at the port of entry was satisfied that this had been effective.

Any fruit or plants not certified or which were ineffectively fumigated were either fumigated again with the gas or destroyed.

Ports of entry for fruit at this time were defined as including Bluff, Dunedin, Christchurch, Wellington, and Auckland, but only at the last four could fumigation be done. Fruit and plants for Napier and Gisborne could be landed there provided they had been passed at Auckland or Wellington.

Live plants, however, were permitted entry only at Dunedin, Christchurch, Wellington, and Auckland.

Importers were required to arrange for all labour, cartage, etc., in connection with the inspection and treatment of fruit or plants and charges were made for fumigation. Cases (58lb.) of fruit from the southern Pacific islands were charged 3d. per case with a minimum of 2s.; all other fruit was charged 6d. a case (48lb.) with a minimum of 2s. 6d. A parcel of 25 live plants or cuttings cost 6d., with a minimum of 2s.

Mr. Kirk, however, recommended in December 1901 that the charges for fruit from different countries be altered as follows: Cook Islands, 3d. to 1d.; other British islands, from 3d. to 1½d.; foreign islands, to remain at 3d.; Australia and foreign countries, 6d. These were approved by Parliament and the reduced charges came into operation in January 1902. The higher charges for treatment of fruit from Australia, America, and Europe were considered a fine for shipment of fruit without treatment and were intended to secure fumigation at port of departure.

In 1902 most fruit entered the country at Auckland and an inspector and assistant were employed full time on examinations of fruit and fumigation.

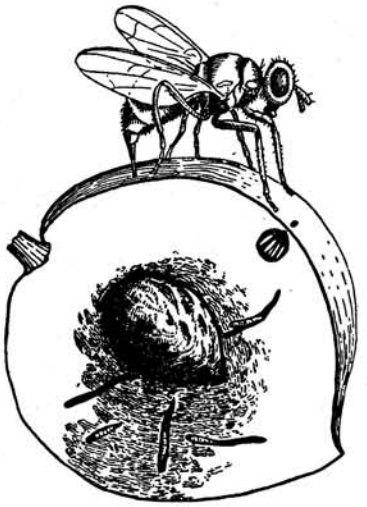
Below is a table showing the total number of cases arriving at each port during the 12 months ending March 1902 and published in the annual report of the Department for that year.

Annexation of the Cook Islands made it very doubtful whether inspection of fruit from these islands could be continued, and because the oranges from these islands were frequently infested with scale insects and sometimes fruit fly maggots, it was stressed that unless the Orchard and Garden Pests Bill, or some other measure with similar aims, was at once passed, infected fruit from the Cook Islands would have to be allowed entry to the colony.

Shipments of Italian lemons and American oranges were reported by Captain Broun to arrive usually in splendid condition, but Mr. Palethorpe reported that American apples received in Wellington brought considerable quantities of codling moth, and only a few lines were passed. The others were shipped out of the colony. No lines of plants and fruit trees were passed without examination even when consisting of only one plant or a bunch of cut flowers. Californian apples landed at Dunedin and Bluff arrived in first class condition and were free from codling moth.

Though the Orchard and Garden Pests Bill was not passed, the following clause was added in 1903 to the Cook and other Islands Government Act Amendment Act:—

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.



[After Sydney "Sunday Sun"

The Queensland fruit fly, a serious pest, lays eggs which hatch in a few days in the developing fruit. This fly and the Mediterranean fruit fly were intercepted in consignments of imported fruit as early as 1900, and the Plant Quarantine Service has always been vigilant to prevent their entry.

This Act, however, did not provide any penalty for breach of the law, and regulations, if they had been introduced, could not have been enforced.

Less fruit was imported in 1903, but 950 more cases of fruit were condemned for fruit fly than in 1902. The increase was chiefly at Auckland and was due to the fact that the island fruit was not inspected before shipment. At this time reports indicated that fruit fly was spreading both in Australia and the islands and the strictest possible measures were advised to endeavour to keep it out of New Zealand.

One hundred and seventy-five packages of plants were received from Europe and Australia and many of these consisted of very large cases or bales, some of which contained as many as 250 plants or trees. Some of the larger consignments were condemned and fumigated before delivery. Recommendations included the addition of aphides and ants to the schedule of diseases.

Five hundred and twenty-two packets were examined at Parcels Post and largely consisted of plants reared in America. A few contained vine cuttings and rooted vines and these were burnt as were others infested with scale insects. Shipments of American apples declined after large quantities were condemned because of codling moth in 1902, and quantities of island citrus fell off because of the strictness of the examination on arrival and the amount condemned to be burnt because of fruit fly. Large

IMPORTATIONS OF FRUIT AND FRUIT CONDEMNED IN 1902

	Total Imported cases	Fruit Condemned			Total condemned cases
		Scale cases	Codlin-moth cases	Fruit-maggot cases	
Auckland	224,536	17,154	1,513	2,736	21,403
Wellington	219,095	9,307	584	807	10,698
Christchurch ..	54,291	3,171	80	107	3,358
Dunedin	48,650	824	80	50	954
Bluff	11,011	—	—	—	—
Total	557,583	30,456	2,257	3,700	36,413

numbers of fruit trees entered through Wellington from Australia, but though they were carefully examined, no trace of scale was found and their condition was generally excellent.

Important Act of 1904

By 1 April 1904 the Orchard and Garden Pests Act, later to become the Orchard and Garden Diseases Act, was consolidated and came into operation on that date. Of this Act Kirk wrote, "It is probably the most important step taken in recent years", and Mr. Boucher, instructor in charge of the greater portion of the North Island, said, "I anticipate a more rapid expansion of the industry than has yet been experienced". Fruit importations again increased in volume and the number of condemned cases increased proportionately. Of the 2046 packages of plants imported in 1904, 39 were condemned. The reports of inspectors showed concern about the risk of introducing fruit fly from Australia and the islands and recommended the strictest measures to prevent its introduction into New Zealand.

Entry of Pests at Wellington

Mr. Palethorpe in his report for 1904 gave a table showing the date on which the various pests were first condemned at Wellington as follows:—

Codling moth

American apples, October 1 1900
Australian apples, December 28 1899
Australian pears, December 28 1899

Fruit-fly maggot

Australian apricots, December 5 1901
Australian mandarins, April 13 1899
Australian nectarines, January 20 1902
Australian oranges, April 27 1899
Australian peaches, January 1899
Australian pears, January 24 1901
Australian persimmons, April 14 1904
Australian tomatoes, December 5 1901
Island bananas, October 7 1901
Island mangoes, December 21 1900
Island maupi fruit, July 12 1902
Island mandarins, April 14 1900
Island shaddocks, May 18 1901

Mealy bug

Australian pineapples, January 25 1900
Island pineapples, December 23 1899

Scale

American apples, October 1 1900
Tasmanian apples, August 20 1900
Australian citrus, September 11 1902
Australian lemons, August 23 1899
Messina lemons, November 23 1899
Island limes, March 15 1902
Australian mandarins, September 18 1899
Australian oranges, August 23 1899
China oranges, January 20 1900
Island oranges, October 17 1899
Messina oranges, December 30 1899
Australian persimmons, April 18 1901

During 1904-05 two Orchard Inspectors were appointed for the North Island and one for the South Island and this enforcement of the Orchard and Garden Pests Act worked a great improvement. Fruit continued to be imported from abroad despite the increase in areas under fruit within the Colony. A new fumigation shed was erected at Auckland during this year, but Kirk stated that "an additional shed four times the size of the present one is needed in Wellington; the inconvenience suffered by importers is excessive".

Experience with Fruit Fly

Pupae of fruit fly found by Captain Broun in the soil accompanying imported plants for the first time showed the necessity for careful examination of all plants. Forty-seven cases of New South Wales apples were destroyed in Wellington because of infestation with fruit fly as well as codling moth.

As evidence of the ability of fruit fly to live in New Zealand Kirk said: "Every year since 1898 numbers have been reared in a plain wire-gauze cage placed on the window-sill of my office in Wellington. The same has been done in Auckland. These flies have paired, and laid eggs in fresh fruit placed in the cage by myself. These eggs hatched, and in turn became full-grown maggots". Experiments were carried out during April and May 1903 to determine whether cool storage of fruit at various temperatures from freezing upward would kill maggots. Oranges were frozen hard and all maggots in infected fruit were dead on removal from cool storage. The freezing did not appear to hurt the ripe fruit, but ruined the unripe.

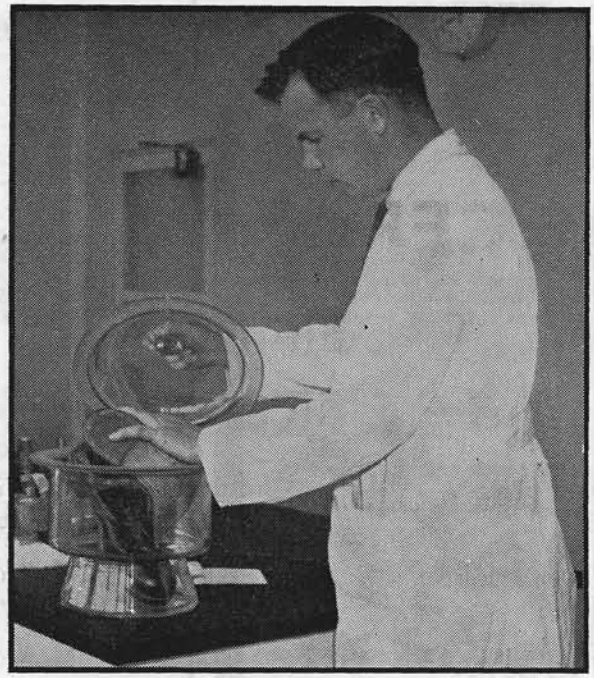
In another experiment the fruit was stored at 32 degrees F. for 3 days. Nearly half the maggots were alive.

Fruit fly maggots were again found in the soil among the roots of plants imported from Australia. In 1905, 24,000 fruit trees were imported from Europe.

Increasing Importations of Fruit

By 1905 the value of imported fruit had greatly increased; in 1904 it amounted to £134,886 and by 1905 it was £156,153. The number of cases of fruit condemned because of fruit fly, however, showed a diminution of 635 cases during the year. American fruit arrived, almost without exception, in splendid condition.

The value of imported fruit had again greatly increased by 1907 and inspection and fumigation were a routine procedure at the ports of entry. For the first time the export of apples was mentioned in the annual report of the Department, arrangements being made to export 600 cases to London by the Motueka Fruit-growers' Company.



A great variety of materials has to be tested by the Plant Quarantine Service. Here boots infested with moth caterpillars are being placed in a desiccator so that the moths can be bred for identification.

Fruit Fly Outbreak

As a result of a relaxation of the regulations a large consignment of fruit containing Mediterranean fruit fly maggots was distributed from Auckland and reached various parts of the Colony. In spite of energetic action, small quantities reached consumers and the infected fruits were naturally thrown away by householders. The result was that later in the season fruit flies were found breeding in peaches in several small gardens at Napier, and in both peaches and tomatoes near Blenheim.

All infested fruit was destroyed and the ground under the trees or where infested tomatoes had grown was several times sprayed with kerosene. Inspection and treatment were so strict that the outbreak was wiped out.

During 1908 fruit flies were found breeding in gardens in Auckland and the same strict measures as were used at Blenheim and Napier were enforced. During this year consignments of plants and fruit trees arrived generally in good condition and none had to be fumigated for scale pests. Most had been fumigated before shipment. During the year the Orchard and Garden Diseases Act was passed.

In 1909 it was reported that there had been no outbreak of fruit fly in any part of the North Island during the preceding season and that careful and thorough inspection of imported fruits at ports of entry, especially with

the assistance of Regulations gazetted in 1908, was effective in protecting the industry. The annual report for 1909, referring to the Orchard and Garden Diseases Act, states: "The great development in orcharding is largely due to the security afforded for the investment of capital by the operation of this Act", and: "There is no doubt that in the near future growing apples for export will be seriously undertaken".

Fruit imported during the year was of better quality and arrived in better condition than previously, and the quantity condemned for fruit fly loss was very small compared with that in the preceding season.

By 1910 the effect of the Orchard and Garden Diseases Act was to decrease the numbers of cases of fruit condemned and shippers were sending to New Zealand only fruit which had been carefully selected. The Cook Islands increased its consignments of fruit to Auckland, but the regulations resulted in very much improved quality. Fumigation facilities were installed in the Cook Islands for the fumigation of fruit before shipment.

In 1911 a much larger number of cases of fruit were destroyed for fruit fly, largely owing to irregularities in shipment from Sydney. However, the rigid destruction of diseased lines and a refusal to examine consignments unaccompanied by official certificates effectually checked this. There was an extraordinary increase in the number of packages of plants imported through Auckland, and fruit trees and plants were reported as arriving clean and free from disease as shippers from other countries became more conversant with the regulations.

By 1913 a large export of New Zealand apples to South America was well established and a better knowledge had been acquired by the commercial growers of the best methods to be adopted for the control of orchard pests and diseases. Many growers acquired up-to-date spraying machinery.

The bean weevil (*Bruchus obtectus*) was intercepted in a line of imported peas in 1914, at which time the weevil was not established in New Zealand. The line was destroyed.

Effect of First World War

Disorganisation of shipping due to the First World War resulted in a decreased export of fruit in 1914-15. The figures of export fruit for 1910 to 1915 were as follows:—

Season	Cases
1910	5,647
1911	6,031
1912	14,869
1913	33,000
1914	67,964
1915	62,164

At this time a great deal of the Orchard Instructors' time was taken up during the export season with the inspection of fruit intended for export. The bulk of fruit shipments arrived from overseas in good condition, but a number of lines had to be fumigated because of scale, mealy bug, etc. It was also found necessary to condemn and destroy a few consignments of oranges infested with fruit fly.

In 1916 a large proportion of the season's importations of Australian fruit trees was found to be infected with root-knot, now known as crown gall. Several consignments were condemned and reshipped and others were destroyed; later, however, condemned consignments were held and allowed to be picked over and non-infected trees were passed.

The big decrease in the quantity of fruit imported during 1918 was attributed to the disorganisation of shipping on account of the First World War. An entomologist, Mr. D. Miller, was added to the Biology Section and began a study of insect and animal indentification. No fruit was exported during 1919 because of the continued effects of the war just ended, but with a large number of new orchards coming into production arrangements were made for regular shipments in 1920. The condemnation of fruit because of fruit fly was confined to only one or two lines and to insect pests hitherto more or less unknown in New Zealand, namely the pear-bud mite (*Contarinia piri*) and a species of leaf-hopper belonging to the genus *Empoasca*, both of which were extremely destructive. Fireblight (*Erwinia amylovora*) in fruit trees broke out for the first time in the Auckland district toward the end of 1919 and eradication measures under special regulations were begun.

Numerous Interceptions of Pests

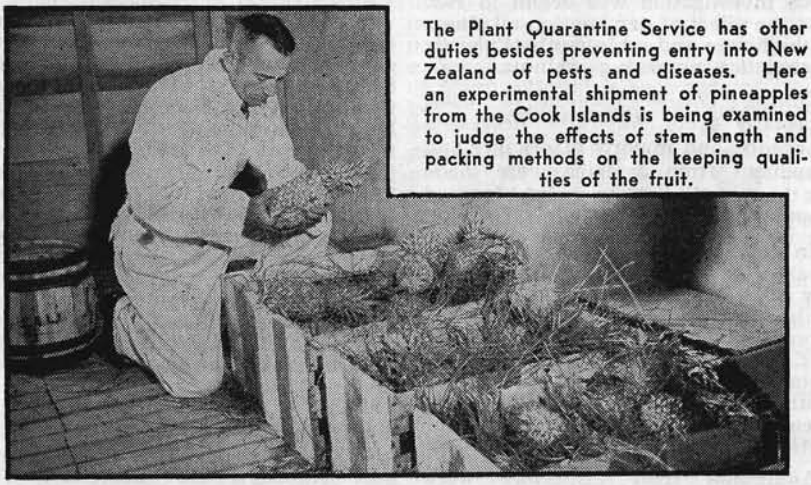
In 1920 maize from Fiji was found infested with Angoumois moth (*Sitotroga cerealella*) and weevil and was fumigated. A number of packages of bulbs were found infested with bulb mite and were condemned or destroyed. J. Myers was added to the entomological staff and assisted in a special investigation into the life history of pear leaf-curling midge (*Dasyneura piri*), which was bad in orchards in the Auckland Province. Methods of control were studied. Two species of maggot flies (*Pollenia stygia* and *Lucilia sericata*) which attacked sheep and their distribution were investigated.

In 1922 the pear leaf-curling midge proved difficult to control. Coconuts from Fiji and Samoa were found to be infested with fruit fly and a number of lines of citrus were condemned for the same reason. Colonies of the woolly aphis parasite (*Aphelinus mali*) were distributed in the main fruit growing areas in 1923 and became firmly established in Hawkes Bay. No lines of fruit were condemned for fruit fly. J. Myers began an investigation into the life history of a cattle pest (*Haemophysalis bispinosa*) in North Auckland, and a survey of the agricultural and horticultural diseases caused by fungi and bacteria was completed by G. Cunningham.

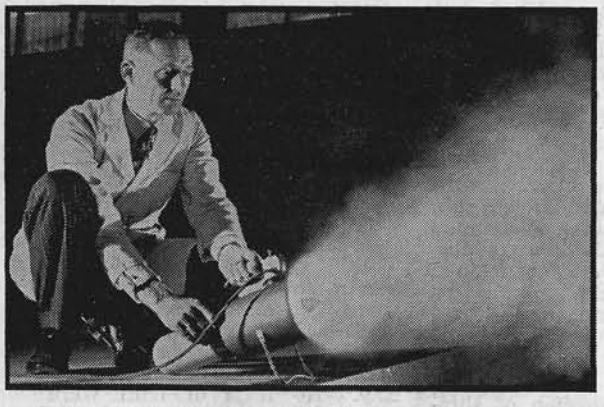
Several consignments of almonds received in 1924 were badly attacked by the Indian meal moth (*Plodia interpunctella*) and had to be reshipped or destroyed. At the time consideration was being given to a scheme of quarantine for imported plants.

In 1925 a new fumigating building was completed at Auckland and is still used for this purpose. Bulb mite infection was again prevalent in imported bulbs and because of this the whole question of bulb importation was reviewed. Recorded in New Zealand for the first time during the year were rust (*Melampsora lini*) on linseed in Canterbury, *Usitilago hypodytes* on *Agropyron repens* in Canterbury and North Otago, and a leaf spot of lucerne (*Pleosphaerulina briosium*) at Ashburton.

Fruit imports from the United States of America increased in 1926-27 because of the removal of the embargo applied to prevent entry of foot and



The Plant Quarantine Service has other duties besides preventing entry into New Zealand of pests and diseases. Here an experimental shipment of pineapples from the Cook Islands is being examined to judge the effects of stem length and packing methods on the keeping qualities of the fruit.



A mechanical fog generator used for fumigating places such as ships' holds, grain stores, and ration stores.

mouth disease. Only one or two other lines were destroyed because of fruit fly. In 1927 regulations were gazetted governing the importation of potatoes into New Zealand to improve the disease situation and the raising of clean "seed". In the same year pear midge parasites became established and showed signs of controlling the midge.

The Introduction of Plants Act 1927 was passed prohibiting the importation of harmful plants (noxious weeds) and new plants into New Zealand. The Seeds Importation Act 1927 regulating the importation of certain agricultural seeds was also passed.

New Legislation

The Orchard and Garden Diseases Act 1928 was passed on 13 September 1928 to consolidate certain Enactments of the General Assembly relating to Orchard and Garden Diseases. Enactments repealed by this Act were the Orchard and Garden Diseases Act 1908, the Orchard and Garden Amendment Act 1914, and the Orchard and Garden Amendment Act 1920. The 1928 Act was later amended by the Orchard and Garden Diseases Amending Acts of 1940 and 1950.

An investigation was begun in 1930 into the effect of dry heat on all stages of the flower and grain moth (*Ephestia kuehniella*) damaging walnuts.

During 1933-34 imports of fruit, especially from Australia, decreased markedly, and imports of oranges and grapefruit from Jamaica were made for the first time. They arrived in good condition.

In 1935 only one line of fruit was treated for fruit fly, but a large quantity of grass seed from New South Wales was fumigated, presumably as a precaution against the entry of cattle tick. Lines of walnut meal arrived infested with the larvae of Indian meal moth in 1935, and also in 1936-37, when a considerable quantity of weevil-infested grain was fumigated.

Additional fruit inspectors were appointed in 1938 to carry out the increased work involved under the New Zealand Grown Fruit Regulations 1938, which came into operation on 28 March. Some consignments of pineapples were fumigated for mealy bug, and seed grain and other items were fumigated for pests of stored products.

By 1940 there was an increase in the quantity of grain, including maize, and grass seed requiring fumigation, especially for grain weevil.

The annual report for 1941 records: —

> Virus diseases appear to be on the increase, and are coming to the forefront as causes of serious loss among horticultural crops. They constitute one of the major problems confronting tomato and strawberry growers, and are also responsible for a reduction in production of cucumbers, marrows, lettuce, and peas. A virus of rhubarb reported for the first time in New Zealand has come under notice in Canterbury, and losses have ranged up to 20 per cent. of the crop in some instances.

The emphasis on inspection about this time appeared to shift to orchard and nursery diseases.

Citrus canker continued to spread at Tauranga in 1942, though prompt eradication measures were reported to have confined it to four orchards. In the Kerikeri district the eradication measures appeared to be successful.

By 1945 no further outbreaks had occurred at Kerikeri and only a few individual diseased trees were recorded from Tauranga. From 1945 to 1949 the position remained unchanged and produce entering the country was largely allowed entry as long as it was accompanied by the necessary certificates and passed examination.

Quarantine Services Considered Inadequate

In 1949, however, a symposium was devoted to the discussion of plant quarantine at the Seventh Pan-Pacific Science Congress held in New Zealand. As a result of this, New Zealand became acutely conscious of the inadequacy of her plant quarantine procedure under modern conditions. Similarly, responsible Governments throughout the world, realising the danger to the agricultural economy of their countries brought about by modern developments, began revising their quarantine regulations to meet the new situation, and in 1951 the International Plant Protection Convention under the auspices of FAO came into operation.

Impact of Fast Transport

Before the Second World War transport of goods to New Zealand took a relatively long time and contact with areas where serious plant pests and diseases were established was made only after a long sea voyage. Despite this many pests and diseases did succeed in becoming established in the country during the pioneering days and the early years of this century. To name but one of these with which all are familiar, the codling moth in apples was here before 1884. In the last decade, however, a revolution in transportation has taken place, for not only has surface transportation become faster, but this period has ushered in air transport, so that today the time taken to cover distances between far points of the globe has been reduced to hours only. Such speed of transport now makes it possible for pests and diseases from which the country was formerly protected by the time taken to get here to find their way into New Zealand on living material and also as stowaways, especially in aircraft, and in many instances dissociated from their hosts. So it has come about that the barrier of isolation has broken down and primary producing industries are exposed to new dangers which could seriously affect production at a time when it has been estimated that it must expand at the average rate of 2½ per cent. a year over the next quarter of a century if New Zealand is to meet the requirements of an expanding population and maintain her exports of primary products.

Many Pests and Diseases Kept out

Though many pests and diseases have succeeded in the past in becoming established here, there are a great many serious ones in countries with which New Zealand trades which are not present here. A few of these are the oriental fruit fly and other serious fruit flies, the giant African snail, the Colorado potato beetle, the golden eelworm, wart disease and ring rot of potatoes, many virus diseases of fruit trees and field crops, foot and mouth disease, swine fever, and rinderpest of stock. Recently a living brown snake was intercepted in bulk wheat which arrived at Timaru from Australia. If any of these pests or diseases were to become established here, production would be seriously affected, and establishment of some of them, foot and mouth disease, for example, would be a national disaster.

Restrictions imposed by plant quarantine are based on the premise that economically it is better to undergo some inconvenience and initial expense to exclude a pest or disease than to have to attempt to eradicate it or at best to control it for an indefinite period, as has been necessary with codling moth.

Plant Quarantine Measures

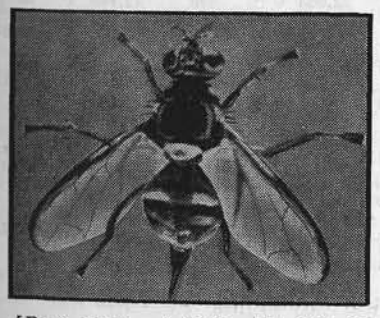
Efficient and well equipped animal quarantine stations protect New Zealand's animal industry. On the other hand control of plant diseases has depended entirely on very small fumigation sheds erected in 1899 and incapable of handling the quantities of plant

material and goods now being imported into this country. Ideally, of course, to prevent further importations of disease the importation of all plant material which could carry new pests and diseases should be excluded, but as this is an ideal which today is quite impracticable, plant quarantine must be a compromise between total exclusion and completely free admission of goods. Some materials, because of the extreme hazards associated with them, cannot be permitted entry; examples are oranges from areas with oriental fruit fly and soil from anywhere. With other commodities such as wheat for milling and dried fruit or rice for consumption there may be little risk.

The whole aim of quarantine must be to provide, with the least possible restriction to trade, sufficient safeguards against the introduction of pests and diseases and the export of infected material. Thus where materials that may contain unrecorded pests have to be imported, fumigation (or other treatment) must be used as a safeguard whenever this course seems prudent. Conversely it is necessary to fumigate some commodities which are exported, such as some flower bulbs sent to Australia, to comply with the requirements of that country.

New Quarantine Equipment

The Government became acutely conscious of the inadequacy of New Zealand's plant quarantine procedure under modern conditions and the inadequacy of its fumigation facilities in 1949. Since then the existing laws and regulations have been amended and immediate plans were set in hand to erect the most up-to-date quarantine stations possible in Wellington, Auckland, Christchurch, and Dunedin. The first of these to be completed is that in Wellington and consists of an atmospheric chamber and two large vacuum cylinders, where plants, seeds, and other produce can be fumigated at ordinary or reduced pressures with methyl bromide for the control of plant pests or with formaldehyde for the prevention of such animal diseases as foot and mouth disease. Ability to treat imported material in this way enables trade to be opened up with areas from which hitherto it has not been safe to import materials. This is most important, as it helps to remove restrictions and free international trade. Thus there is in this station a small, fully equipped refrigerated cool store.



[*From Senate of California's "Special Report on the Control of Oriental Fruit Fly in the Hawaiian Islands"*

The oriental fruit fly is one of the many serious pests which have been prevented from entering New Zealand by the vigilance of the Plant Quarantine Service.

[*Photo News*

Indicative of the interests served by the Plant Quarantine Service and the commercial and scientific bodies concerned in its operation is this group at the official opening ceremony of the new fumigation station at Wellington. Left to right—The Minister of Agriculture, Mr. Holyoake, his private secretary, Mr. R. D. Steel, the merchandise manager of the New Zealand Loan and Mercantile Agency Co. Ltd., Mr. V. C. McPhail, and the Director of the Entomological Research Station of the Department of Scientific and Industrial Research, Dr. D. Miller.

Cool Storage Investigation

Study of the effect of cool storage on the Natal fruit fly proved that in oranges all stages of the fly can be killed by storing the fruit at a temperature of 31 degrees F., plus or minus one degree, for 21 continuous days. As a result of this study trade with South Africa has been begun and today New Zealand has another source of supply and imports considerable quantities of South African oranges. Previously it was not considered safe to import oranges from South Africa, because no satisfactory control of the fruit fly was known. Similarly it is hoped to open up trade with Spain and in November 1954 a trial shipment of Spanish grapes packed in barrels was imported under the same stringent conditions of in-transit cool storage which is effective for the control of Mediterranean fruit fly. This is the first time Spanish grapes have been imported, and the shipment was made possible by the study of quarantine techniques, so making it safe to import under stringent cool storage. Studies on methods of fumigation and quarantine techniques seeking to open up trade with other parts of the world are being made in the station's well equipped laboratory staffed by qualified scientific personnel.

In this way and by providing these up-to-date stations and amending the law New Zealand is protecting her primary industries and honouring her obligations under the International Plant Protection Convention 1951. In addition there is now a fully trained and qualified staff of 20 Plant Quarantine officers responsible for meeting all overseas vessels and aircraft arriving in New Zealand. The Plant Quarantine Service is also used as a training ground for plant quarantine officers of the various Pacific Islands such as Samoa, Cook Islands, Niue, Tonga, and Fiji. These officers are trained in methods of methyl bromide fumigation, wharf and aircraft inspection procedure, and New Zealand plant quarantine methods. After training they return to their own countries able to conduct plant quarantine and able to instruct others.

Co-operation Needed

To be successful plant quarantine requires the fullest public support and the co-operation of every traveller and importer. Importers, whether commercial or private, can assist by making sure that every consignment of plant material is accompanied by a health certificate and that the nearest Plant Quarantine Officer of the Department of Agriculture is notified in advance of the arrival of highly perishable material such as bud wood so that it may be received, treated, and dispatched as quickly as practicable. By acquainting themselves with the regulations before importing plant material importers can avoid unnecessary disappointments and delays, and if any doubts exist as to the best steps to be taken to facilitate delivery of material, the Department of Agriculture should be consulted.

With the exception of the upper illustration on page 116 and those otherwise acknowledged all photographs are by National Publicity.