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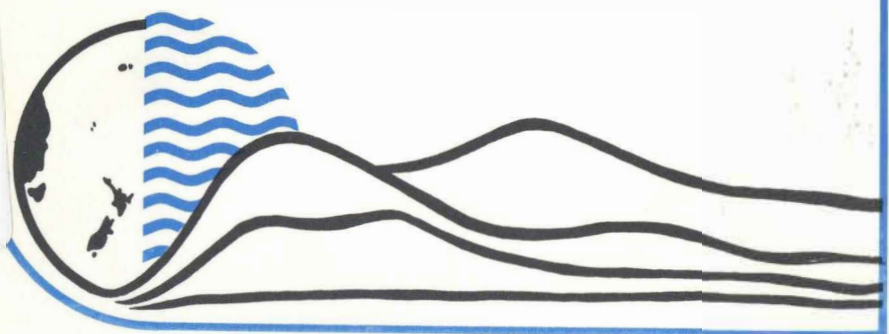


Report No.4

Plant health protection in the United States

J.D. Currie

The Lincoln College Foundation



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J.D. Currie

The Lincoln College Foundation
Lincoln College, Canterbury, New Zealand

Series edited by J.E. Goulter

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ABOUT THE AUTHOR

Jim Currie is chief advisory officer for plant health with the Ministry of Agriculture and Fisheries. He holds a Diploma in Valuation and Farm Management and a Diploma in Agricultural Science from Lincoln College.

He joined the Ministry of Agriculture and Fisheries in 1957 as a farm advisory officer at Hamilton, and worked in Whangarei, and Oamaru before joining the ministry's head office. As chief advisory officer for plant health he has responsibility for administering national plant health protection services authorised by the Plants Act of 1970.

He has implemented guidelines for outbreak procedures, which include a manual and in-service training for about 400 ministry staff with responsibilities in plant protection. In addition, he has been involved in the development of a computer based information service for the ministry.

Mr Currie took up his Lincoln College Foundation study award in August and September, 1980.

INTRODUCTION

New Zealand has less than 20 per cent of the serious plant pests and diseases that could establish in our temperate climate. Pastoral farming purchases above 75 per cent of our imports and our horticultural export potential has been estimated as increasing to \$500 m in the 1980s.

Relative freedom from pests and diseases of international quarantine significance provides a critical trading advantage. This will only be retained by providing an efficient and effective quarantine and plant protection service. Should a pest such as fruit fly gain entry and establish, the consequences would be disastrous for our horticultural industries. Japanese beetle could be equally devastating in our pastures.

Quarantine is an international discipline. As a nation dependent on exports of primary produce for our continuing prosperity we must be aware of, and ready to respond to, all quarantine developments that could be significant to retaining our present trading advantages.

The objectives of the study tour were:

- * to look at international experience in plant health protection,
- * to gain personal contacts with people responsible for health and quality assurance,
- * to acquire knowledge to strengthen New Zealand's quarantine screen,

* to assess the effectiveness of methods in use for controlling the exotic pests and diseases that continually threaten our economy.

An additional aim was to compare, for the New Zealand Potato Board, the New Zealand approach to potato cyst nematode control with U.S.A. and U.K. programmes. I do not intend, in this report to repeat the summary of my findings in this area which was presented in an interim report to the Potato Board in December 1980. It is intended to prepare a separate report on this subject after the potato industry responds to the recommendations made in the interim report. A visit to the United Kingdom, which made up part of this study tour, was largely concerned with potato cyst nematode control and associated research. As such it is reported elsewhere.

After an outline on plant health protection philosophy and operation in New Zealand, the main part of this report is a diary record of observations. Throughout this record, key points, or issues with particular relevance, are highlighted in italics.

PLANT HEALTH PROTECTION IN NEW ZEALAND

As a signatory to the International Plant Protection Convention, New Zealand must provide a plant protection service. The authority for this comes from the Plants Act, 1970. Responsibility for administering this act has been delegated to the Plant Health Section, Advisory Services Division of the Ministry of Agriculture and Fisheries.

The objective of the section is "to improve and protect agricultural production in New Zealand through the promotion and co-ordination of plant health protection against exotic and endemic pests and diseases". Within New Zealand a wide range of occupational groups contribute to this end: Diagnostic and Research Scientists, Advisers to growers and farmers, Agriculture Quarantine Officers who screen imports, and Field Officers who monitor the internal health status.

The Deputy Director (Plant Health) heads the plant health section.

My job as Chief Advisory Officer (Plant Health) includes technical, staff development, and administrative duties that contribute to the promotion and co-ordination of the plant protection service necessary for the future prosperity of New Zealand.

An *Outbreak Manual* has been prepared, and staff training within the established guidelines is continuous. Contingency plans for containing an

exotic introduction such as Fruit fly and Alfalfa weevil have been prepared and internal health certification schemes, e.g. for garlic and beans, are operating. Supervision of the \$1½ million Potato Cyst Nematode control programmes is a major national undertaking.

Pests and diseases of all the major commercial crops have been collated regionally into a New Zealand manual and this has now been supplemented by sets of 1,000 colour slides that have been made available to both advisory and teaching services. Current programmes include conversion to a computer data base as part of an increasing emphasis and direction towards quality assurance by positive advisory leadership in protection and prevention, in preference to the traditional defensive inspection for quarantine and control approach.

LOS ANGELES : ENTERING A CONTINENT, AND THE FRUITFLY OUTBREAK

Ports of Entry: The Animal and Plant Health Inspection Service (APHIS)

The city of Los Angeles has a comparable population to New Zealand; there are seven million people in the immediate vicinity and 21 million in California. The city is serviced by adjoining ports at Long Beach and San Pedro where about 250,000 containers are received annually - 20 per cent of the U.S.A. total. The International Airport has 25 inward overseas flights daily. (A further 15 by the domestic Western airline that services Hawaii are treated as overseas arrivals.)

The number of containers with agricultural products are small. Imports from New Zealand include kiwifruit and apples, but in the latter case the pre-export clearance in New Zealand coolstores by U.S.A. Inspectors facilitates entry.

This practice has staff development advantages also and it could well be considered for citrus type bulk exports to New Zealand, in line with current exclusion policy developments by the APHIS. They are posting residential quarantine, liaison/advisory specialists in the regions of the world where plant health status is an important requirement for continuing trade.

The port regulatory staff (10 inspectors and 2 supervisors) receive advance copies of freight manifests and they check all likely hosts on arrival.

They are aided in this work by a computer terminal in their office that records all interceptions at U.S.A. ports and enables forewarning of inspectors at subsequent berthing locations. This system has longer term international 'alert' possibilities as M.A.F. develops computer capacity.

Of interest was the non involvement of the inspectors with supervision of garbage disposal from ships.

The airport facilities are now inadequate, and many inward flights from Asia/South Pacific are routed through Honolulu for customs clearance and advance warning of possible quarantine risks. A total of 14 inspectors and 3 supervisors are permanently based at Los Angeles International Airport, with 3 inspectors on rostered duty from 6 a.m. to midnight. Two inspectors service the main passenger customs hall, responding to lights at any bay where customs intercept goods of quarantine significance. A satellite terminal is served by one inspector. Aircraft freight manifests are received promptly on arrival, with two inspectors when visiting the freight depots of each airline that has plant and animal produce in their cargo.

Plant Inspection Policy

In California, the Federal USDA and APHIS are responsible for international plant health certification. Pre-export field inspection and post entry quarantine is a co-operative federal, state and county programme.

Information on philosophy, permit application and procedures is very clearly presented in a three page Quarantine Circular No 214 dated 3 November 1978 available from the State of California, Department of Food and Agriculture. This circular could well be included in New Zealand Export Manuals together with a summary of the Federal/State/County overall responsibilities as provided.

All nursery stock arriving at the airport is checked. Inspectors have authority to clear up to seven plants. If the consignment is greater than this, it must pass through the Federal Plant Inspection Station, situated approximately one mile from the airport. The station has three officers on duty 8 a.m. to 4.30 p.m., 5 days a week - an acting officer-in-charge, and two specialist scientists.

This team inspects all propagative material, making a thorough examination of a 2 per cent sample before completing the documentation. Where post entry quarantine will be required the basic limit is 3000 plants of one species and one acre. However, the general impression was of fairly free access (subject to freedom from pests and diseases). Kiwifruit plants from New Zealand, for example, are not restricted in numbers and they have no quarantine requirements because imported pests have never been found on these plants after many years of inspection.

At the Inspection Station the presence or boring on scale insects will result in mandatory fumigation. For other pests, diseases and galls, hand picking is practised if the incidence is very light and the plants few. If plants are known to be intolerant to Methyl Bromide and provided scales and borers are not present, dipping as required with either Bordeaux, Captan, Malathion, Carbaryl or Sevin is carried out. Two South American snails are closely watched for. The station has a limited fumigation capacity and all large commercial fumigations of fruit, vegetables and seeds are treated at the importer/exporters' expense by one of two licenced commercial fumigation companies. I visited the long established California Cotton Fumigating Company in the seaport area and noted two 2000 cubic foot and a new 3200 cubic foot chamber within this substantial covered storage facility.

The identifying specialist refers unfamiliar interceptions for confirmation by Washington, together with his tentative diagnosis. Three successful diagnoses in this way usually leads to the entomologist/pathologist receiving "discard authority" without the need for head office confirmation.

The volume of plant units processed by the inspection station is about 100,000 per working day, and New Zealand nursery plants were favourably commented on. However, concern was expressed about the presence of live thrips on some lines. Discussions on the newly published New Zealand Gazette notice covering fresh fruit and vegetable imports brought out; confusion as to whether fumigation of stonefruit should be pre-export or post-entry.

Fruitfly Outbreak - San Fernando Valley

My first introduction to the fruitflies as a major threat to California, in particular, was at Honolulu where this pest is endemic. There are about 30 flights daily to mainland USA and the airport has a substantial establishment of 65 inspectors and supervisors. A large proportion of their work is devoted to ensuring that infested fruitfly host material is prevented entry to the mainland. Without this priority 22-25 inspectors would be employed.

My second impression was the politically desirable, but scientifically fruitless effort in servicing fruitfly lure traps around the Los Angeles airport. A fruitfly has never been trapped after many years monitoring, and it would seem that better siting would be within dense host areas.

The opportunity to visit a fruitfly outbreak in the San Fernando Valley was very much appreciated. Time spent at the State controlled headquarters at La Pierce College was invaluable, as was the briefing provided by the overall controller Martin Muschinske, Economic Entomologist, State of California/Department of Food and Agriculture. Technical details are available from their current Fruitfly manual.

The population in the San Fernando Valley includes many Mexican migrants and others who move to and from Hawaii. The identification on June 6 1980 of Mediterranean Fruitfly in a domestic garden was the first in California since 1975 and could have resulted from illegal host material from either of these sources. The response had been an immediate national priority with Federal, State and County staff all co-operating to follow the standard procedures. These had previously succeeded in eradicating this serious threat to the \$12,000 million dollar Californian fruit and vegetable industries.

At the headquarters a noticeboard set out seven task groups:

Sterile Fly Release (Control)

- 1 Rearing laboratory
- 2 Roving - road vehicle
- 3 Aerial

Fly Collection (Quarantine detection)

- 4 Laboratory
- 5 Fruit collectors
- 6 Trapping
- 7 Identification

Once identification was confirmed the standard Latin square grid pattern approach was introduced with 405 trapsites with both male pheromone lures and insecticide baited female attractants in use and monitored weekly. Fruit from all the adjoining houses (1 block in each direction) had been collected and placed on a netting tray in owner/sequence coded, sealed containers. Any maggots then dropped to the sand floor were recovered for identification by sieving after two weeks. Infested maggoty fruit at the initial identification site was disposed of on the property through the garbage disposal unit and insecticides were applied to foliage. Care was taken to leave some host material within the outbreak zone so that the Medfly did not disperse.

The project was well advanced after 40 days with the outbreak now considered a small one. Nevertheless the total project area of 200 sq. miles, embracing a metropolitan area, was to be saturated with sterile flies as soon as the outbreak had been contained by standard traps, insecticide treatments and host material destruction. The initial release of 10 million flies, (\$200/million) could be made 2 weeks after ordering from either Hawaii or Mexican sources. These flies can be readily traced by their prior irradiation that glows when a specimen is exposed to back lighting in the laboratory.

The most effective approach is to establish three zones; the infested centre where immediate eradication is attempted, a 200 metre radius intensive trapping, sampling and baiting zone, and a 2 km quarantine zone from which no host material can be removed.

It was noted that detailed maps and progress reports were being prepared for Japanese authorities concerned about their substantial imports. A similar request has now been made for New Zealand with the far more serious outbreak in the Santa Clara county south of San Francisco. It would appear likely that the current policy of two stages in the life cycle, or 25 flies will be revised as an outbreak definition.

Fruitfly has been intercepted 300 times at our ports of entry since 1955 and Medfly was eradicated three times in 1955-59.

If we were to relax our quarantine standards we could be faced with a serious eradication programme. The cost to date for the control of the current Californian outbreaks has passed \$100 million. A special MAF fund for quarantine awareness publicity is vital for New Zealand as is the need to co-ordinate the present piecemeal efforts by concerned individuals. Early reporting of unusual insects / unhealthy plants by the public is important. A two week delay in identification for the Santa Clara county was time for a generation of fruit flies. This resulted in 1,500 people burying 20 tons of fruit a day, at the cost of \$98 million, against \$2 million for the eradication at Los Angeles, and the job is not finished yet.

CALIFORNIAN PLANT HEALTH

The sub-tropical climate of California, together with irrigation development have combined to make cropping a significant contributor (50 per cent) to the State's economy. This prominence is reflected in the sophisticated growth of the State's plant protection service. Each state of U.S.A. is responsible for its own plant health regulations and California is particularly concerned with excluding new pests and diseases. To do this they operate check points on state boundaries, supervise post entry quarantine and maintain internal control through certification schemes. The headquarters of the Californian Department of Food and Agriculture is in Sacramento, the state capital.

The plant health protection activities within the State of California fall within two broad groupings, exclusion and detection. Field inspections associated with regulatory responsibilities are carried out by each County within the State, the Inspector Biologists who do this work are assisted by excellent manuals supplied by the State specialists, who also provide scientific back up support.

There are 10,000 nurseries in California. A comprehensive crop certification service, for freedom from especially injurious pests and diseases has been developed. To provide a health control guarantee they use the clearly visible *Pinto Tag* (so named for its two colours, like Indian piebald horse). The tag was introduced in December 1974 as part of a scheme to identify produce that could move freely between counties. It has now become a source of commercial advantage and of pride for growers, to be able to display their certificate authorising

use of the Pinto Tag. This health assurance guarantee facilitates movement of plant material between Counties within the State without further inspection in transit. It is now accepted by other States. The concept could well have a place within the present move to quality assurance for New Zealand exports.

Certification and Registration Schemes of current interest to New Zealand include Cymbidium Orchids, Avocado fruit, Garlic, Walnuts.

Certified foundation seed for industry and export are held and bulked by Davis University with State and Federal Support. Also observed were a field certification inspection of beans, and export clearance sampling of wheat prior to direct shipment from the port of Sacramento to Paraguay and China.

Aerial spraying was a common sight and it was noted that the County Inspector's responsibility for monitoring agricultural chemical application regulations was one of their less popular activities. *Ditylenchus dipsaci* (stem and bulb nematode) appeared to be a problem judging by the prominence it was receiving in health certification schemes.

I took the opportunity to have discussions with Alex French, Principal Staff Plant Pathologist (action to contain Dutch Elm Disease); Quintan Holdeman (distribution and control of *Heterodera sachitti* and Pine Wilt); Jim Koehler, Chief of Control and Eradication (Fruitfly outbreak programme); Barbara Hars, Seed Botanist (New Zealand import requirements and request for New Zealand Gazette notices) and sundry specialists responsible for pollution and vermin-type protection activities.

The diagnostic service was most impressive. Thirty thousand specimens are received annually (6,000 pathology and 20,000 entomology). The laboratories were very well equipped. The entomologists had outstanding reference sets of insects with individuals encouraged to specialise in various orders.

A practice that seemed to have immediate application for New Zealand was the morning diagnostic clinic, when all specimens received the previous day were tabled with all specialists in attendance (both experienced and junior). Probable cause of the problem was arrived at by consensus with the specialist concerned then accepting responsibility for following the specimen through to the diagnostic report. A target of a two week maximum time period from receipt to report was stated, as was a need for 80 per cent plus accuracy in diagnosis and their legal responsibility for the reports. Top priority went to quarantine specimens, lowest priority to back-yarders.

The two days at the State of California headquarters were only sufficient to become aware of the opportunities for New Zealand staff development. California is comparable to New Zealand in the importance of agriculture to the economy. In New Zealand animals take precedence, in California plants. I cannot over-emphasise the advantages to be gained from New Zealand staff, both diagnostic specialists and regulatory control administrators having the opportunity to work in the dynamic environment created by the highly motivated team of specialists in Sacramento. Their manuals, including systems for alerting county inspectors and their experience in developing an efficient and effective plant protection screen have immediate and continuing application to New Zealand.

GYPSY MOTH IN MICHIGAN

The green countryside was a sharp contrast to parched California. Temperatures were comparably high, but the proximity of the Great Lakes ensured a high humidity. Snow covers the ground during the five months of winter, and the northern third of the state is extensively wooded parkland.

Agriculture is important to the State's economy. A wide range of crops are grown in association with intensive centres of cattle farming.

A tour of the State with Dick Moore and Murray Hannah, a regional entomologist with the U.S.D.A., included a plantation of defoliated trees, stripped by a heavy infestation of gypsy moth larvae. Gravid females, egg masses, and the distinctive caterpillars smothered the tree trunks.

The gypsy moth, a devastating defoliator of the native white pines, oaks, etc. has spread slowly west from its first point of entry into the U.S.A. on the East Coast. The reason for the slow spread is the prevailing winds from the interior to the coast. The egg laying moths

spread with the wind. Movement west is most commonly with egg laying masses attached to timber or camping equipment. As Michigan is the furthest state to the west with gypsy moth present, and because of the vast area of susceptible parkland forest, a Federal/State containment programme is considered justified to contain the light overall infestation.

The state is surveyed into 36 sq mile townships. Within each of these mapped areas, 12 pheromone lure traps are sited and monitored. The traps cover a third of the state. If 10-15 moths are recovered from a trap a co-operative aerial spraying programme is undertaken with traps increased to 32 to delimit the infestation. The budget for the current year is \$700,000 for the aerial spraying, shared equally from state and federal funds. The core areas of infestation is about 2,000 to 2,500 square miles of which 3,000 acres are sprayed annually.

Sevin (carbaryl) was initially used but Dimilin at 1 oz/acre applied twice (half an ounce/half gallon of water) is now preferred. This new material is very effective, and has the added attraction of being non-toxic. Control is achieved by inhibiting the kytin formation in the insect skeleton.

One disturbing feature of quarantine/regulatory control programmes in the U.S.A. became apparent. Gypsy moth would appear to be ensured of a long term listing on any control programme, whilst the rights of every individual remain paramount over the good of all. Citizens can and do take out court injunctions against spraying over their land. The inevitable delays that follow then ensure a thriving foccii of infestation for the new season. The Plants Act 1970 in New Zealand gives the authority that appears to be lacking in U.S.A.

THE NATIONAL BIOLOGICAL CONTROL SATELITE FACILITY

The National Biological Control Sateelite Facility was strategically sited at Niles, Michigan, in 1966 on the southern boundary of Michigan. The 40 staff are responsible for bulking up screened parasites of serious pests of crops. They are required to both build up and then control the distribution of the parasites. Expertise in laboratory rearing method developments have been supported with outstanding manuals and visual aid sets to guide field officers.

Cereal Leaf Beetle (*Oulema melanopus*)

When this beetle of European origin became established in the U.S.A. it became a significant pest from the mid 1950s. Preferred hosts are spring sown barley and oats with 40 per cent reduction in yields resulting from larvae concentrations in the flag leaf. The soft red winter wheat proved particularly susceptible, and the breeding of a downy, partially resistant cultivar, had only been a limited success. To prevent its further spread westwards into the wheat belt a "Malathion belt" - insecticide strip - had been established along the Illinois boundary.

The U.S. Department of Agriculture was aware of specialist wasps parasitising this beetle overseas and they commissioned laboratories in Japan and France to select parasitic wasps that could be suited to U.S.A. conditions. This led to four wasps being introduced and screened at Delaware, before passing to Niles for bulking and distribution.

It took 10 years to get the parasites established, and the project has been so successful that it is now virtually impossible to find the cereal leaf beetle. Well documented reports on this programme are held as an invaluable guide should New Zealand undertake similar projects.

In the initial stages farmers were contracted to not spray insecticides on their cereals within a one mile buffer zone from which field parasitised larvae would be introduced and subsequently recovered. It had proved difficult to rear sufficient hosts for this purpose in the laboratory. Contracting farmers grew repeated oats crops to optimise build up. Parasitised larvae were collected by harvesting infested flag leaf. After a laboratory check the infested and parasitised leaf was used to spread the parasite, by leaning it against field crops. Distribution began in 1967 starting with Ohio, Michigan and Indiana and gradually extending to the other cereal growing states. The U.S.D.A. used their own small plane for the purpose.

The exceptional control achieved by the programme was in part contributed to by the winter diapause of the wasps - they fly when spring temperatures are 65^oF to precede the beetle - and the absence of any hyper parasites of the wasps.

The estimated saving to the taxpayer from quarantine and chemical control is \$15 million annually; a most impressive success story.

Mexican Bean Beetle

A primary pest of egg plant, this semi-tropical *phaseolus* pest, causes significant damage to soya beans. Parasitic wasps occur in Asia, India, China and Japan, but to date biological control has been hindered by no natural diapause and the need for annual releases and repeated cycles. The parasites are effective and it is hoped that a new strain from Japan will successfully over-winter when released in the Mississippi River Valley. This programme is proving a real challenge.

Alfalfa Weevil

The pest has been present in U.S.A. since 1902. The value of the U.S.A. lucerne crop has been estimated at \$4,000 million annually, with losses attributed to this weevil at more than \$1,000 million.

No cultivars of lucerne have resistance to it and control is further complicated by the two distinct strains of the weevil that are present. The original strain spread from Utah and a secondary one came from the East Coast. Of 13 wasp predators introduced in the east some have been initially successful. In the 1960s it was common practice to use Dieldrin and heptachlor insecticides for control of the weevil. Over 95 per cent of the lucerne crops were sprayed and this also checked the wasps. Another problem has been the life cycles of the weevil; this is basically one generation per year but the season can be extended by over wintering eggs larvae and adults and two peaks can result. The critical period for control is in the early spring when other insects pests of lucerne are inactive.

Even with all the limitations, five species of parasites have been selected for intensive laboratory study, bulking up and release. Whilst progress has not been as spectacular as with cereal leaf beetle some measures of the success can be gauged by the reduction of insecticide useage. Only 20 per cent of the lucerne crops are now sprayed and with this useage continually declining the cost/benefit of biological control is clearly evident.

Fortunately for N.Z. we have managed to keep out the major targets for the U.S.A. biological control programmes. However, the principals being applied could well have a place for re-thinking the control of some of our more serious endemic pests, and should any of these exotics arrive we should immediately seek and use the expertise that is already available.

MARYLAND: FEDERAL HEAD OFFICE

U.S. Department of Agriculture and the Animals and Plant Health
Inspection Service

The U.S.D.A. is a Federal national service with 82,000 employees. (The staffing has been constant since 1952.) The head office is in the capital, Washington, and the two top positions, Secretary and Under-Secretary of Agriculture, are political appointments. The Animal and Plant Health Inspection Service (A.P.H.I.S.) is one Division of the U.S.D.A., with the career staff led by an Administrator and three Deputy Administrators. The Deputies head the three groups within A.P.H.I.S.; Veterinary Service, Administration and Plant Protection and Quarantine (P.P.Q.).

Plant Protection and Quarantine

There are 1,700 staff in P.P.Q. National planning is controlled by a team of 60 based at Hyattsville about 20 miles out of Washington. Field programmes are administered by Regional and Area Directors. The largest group with P.P.Q. are the 1,200 in the Agricultural Quarantine Inspection Program, providing field services in international quarantine - 900 of these staff are at ports of entry. A further 400 are employed in Pest Program Development with responsibility for surveying endemic pest and disease status and supervising outbreak and quarantine control policies (e.g. fruitfly, gypsy moth, potato cyst nematode, grasshoppers, etc.). There are 14 Plant Inspection Stations providing scientific diagnostic services, and they can call on specialist scientific

opinions from the Research Division of the U.S.D.A.

Within the head office 'National Planning' group for P.P.Q. there are sub groups with delegated areas of responsibility. *Harold Shirakawa* is developing an interesting new concept as International Program Co-ordinator. The three major trading zones exporting to the U.S.A., South America, the Pacific and Europe will now be serviced by quarantine specialists posted overseas. These strategically located officers will be responsible for close liaison with exporters to the U.S.A., to strengthen the prevention role of quarantine. *Marshall Kirby* (currently working on potato cyst nematode control methods development at Long Island and previously with the South Pacific Commission based at Fiji) has been selected to cover the Pacific zone from South East Asia.

Homer Autry heads the Regulatory Support staff with responsibility for overall guidance on quarantine regulations and administration, both interstate and international. They update manuals and process applications for import and export permits. New Zealand Gazette notices covering quarantine requirements and their P.P.Q. systems when processing applications were discussed to mutual advantage.

Robert Kahn is a plant pathologist with special responsibilities for post entry quarantine supervision. His main area of work covers normally prohibited imports of live plant material for research evaluation. However his responsibility also covers crop imports and in particular applications to the previously banned crops cleared for a renewal of trading. To this end the New Zealand application for the recognition that citrus canker has been eradicated in our country, was discussed and the supporting documentation favourably commented on. The delays in responding were explained by the procedural steps that must be followed prior to clearance.

Dick Cowden is responsible for Pest Program Development. The planning and guiding of internal Federal - State co-operative plant pest control programs is a major undertaking. This is best illustrated by some examples of the substantial funds that are provided in Federal

support for State pest and disease control programmes. The Mediterranean Fruitfly outbreaks in California in 1980 have already cost in excess of \$100 million in eradication attempts (50:50 cost sharing Federal-State). Potato cyst nematode control at Long Island has a \$1 million annual budget, gypsy moth control \$750,000. However probably the most impressive to one from a pastoral country was the grasshopper control programme on rangeland. 7.2 million acres were aerially sprayed with insecticide in 1980 and between 5 and 6 million acres were scheduled for 1981. The aim is to reduce substantially over-wintering grasshoppers. To participate it is necessary to form a group scheme with a minimum size block of 10,000 acres. Malathion is used wherever possible (about 80 percent) because of the lower cost, with carbaryl only used at high altitude or early in the season.

The A.P.H.I.S. have their own planes based in Texas but their use is confined to trial work and monitoring (particularly to ensure that bees are removed from the target areas). Owners of both honey bees and the leaf cutter and alkaline bees used for pollination of lucerne seed crops are given notice to remove them from the proposed areas for treatment, with no compensation provided if they fail to heed the warning. My immediate reaction to the \$12.2 million total cost (\$1.80/acre) was scepticism at the cost/benefit. However, my doubts were partially resolved when I found that ranchers meet up to a third of the treatment cost, with the State paying the difference between this and the 40-45 per cent Federal contribution of \$5.5 million.

From further questioning it was found that over the past 10 years the area treated had been about 1.25 million acres annually and that the current escalation was following the upward trend in beef prices. Whatever the reason there would appear to be political, taxation or production subsidies contributing to this pest program.

Charlie Amyx with a \$3.5 million budget for Methods Development had a particularly interesting field of responsibility; to reduce costs of programmes and to improve effectiveness by promoting research and field-testing the findings. The current priority was the training of detector dogs that were already shaping up well in sniffing out meat and fruit at ports of entry and in Post Office mail rooms. Perhaps we should

be planning to team one of these specialist dogs with the drug detecting dog now in use at New Zealand ports of entry.

Other projects included Witchweed eradication, Hydrilla water weed control by fish, and the potato cyst nematode control programme. It was this group that first brought my attention to the contamination of the sandy Long Island aquifer by the nematicide (Aldicarb) used for the combined control of Colorado potato beetle and potato cyst nematode. Five Field Development Centres are continually testing equipment and procedures.

Other sub-groups, monitor pesticides with particular emphasis on environmental evaluation, co-ordinate co-operative economic pest surveys, supervise clearance procedures at Inter-state and International boundaries and participate with the Personnel Division in staff training and development.

Two observations were made that could be relevant to current trends in New Zealand : the concern about tighter control on the use of chemicals for agricultural pest and disease control as urban representation in the legislators increase; and computerised staff appraisal methods leading to performance appraisal and merit pay training with an associated emphasis on specified job duties. The simple aim appeared to be to define precisely the job content. Should the employee then fail to perform within the specified duties, dismissal could follow.

Professional Development Centre

The first advantage comes from their responsibility for continuing staff development. Thus with the aid of computer records of the mandatory proficiency exams that all staff must sit, they can identify individual weaknesses and provide group training accordingly. They had an added advantage in being available to meet requests for assistance with staff development in the field. The current emphasis was on the new 'Noxious Weeds Act' and preparing staff for administering this. In this case it was of interest to note that a commercial firm specialising in development projects had been contracted to prepare manuals and a training schedule. This practice is increasing.

The present quarantine facility is at Glen Dale where I met *Joseph Foster*, virologist in charge. He is responsible for screening imports of normally prohibited plant material (for evaluation) by either U.S.D.A. or university scientists. Apples and prunus cultivars were prominent. Also visited was the Plant Germplasm Quarantine Centre at Beltsville controlled by *Ed Imai*. This is one of the 14 inspection stations of the U.S.D.A. It has a special responsibility for screening normally prohibited seed imports, for scientific evaluation. These imports require prior permits and the issue of distinctive green and yellow labels with these ensures that imports are directed straight to this centre for opening and inspection in quarantine. About 100 consignments are checked per week, with any suspect interceptions referred to specialist scientists for diagnostic confirmation. This centre maintains a register of all germplasm, imports and exports, for the U.S.A. and in the latter case their prior approval is mandatory.

From discussions with the staff I found that the other inspection stations are all based at strategic entry ports, where their main function is screening private imports of permitted nursery material. With seeds, most annual grasses and some woody plants are open for anyone to import without permits but subject to monitoring for insect contamination: Medium risk seeds require a permit and are cleared at ports. Normally prohibited seeds for scientific evaluation must have a permit and go to this centre. With vegetative material, permits are required, with low risk screened at ports, medium risk subject to two years quarantine post entry and normally prohibited material for research requiring prior approval.

The Agricultural Research Administration has a similar function to the biological science divisions of the New Zealand D.S.I.R. and I visited the nematology complex at Beltsville where a national research/diagnostic service is provided.

NEW YORK: PLANT PROTECTION AND QUARANTINE

New York, with 12 million people concentrated in about 25 square miles and the volume of inward movement of plant and animal products to service 10,000 restaurants alone, took some adjusting to. Bob Tango, District Director of the Quarantine Inspection Service, took me on a whirlwind tour when I saw the three operational districts servicing defined port facility groupings. I was able to see uniformed P.P.Q. officers at work in the fruit and vegetable markets in the Bronx, at the wharfside checking for Khapra beetle, and in New Jersey at the 500 acre container terminal.

Most of the inspection staff are degree holders and an estimated third are young women. This proportion is increasing with about 50 per cent of the recruits now female graduates. There appeared to be, as in other states, a high representation of staff of Japanese and Latin-American origin. All were enthusiasts, concerned about the big upheavals that transfers for promotion entail. The service was efficiently run and very comparable to the New Zealand Agricultural Quarantine Service. Their operational procedures have already been described in the Los Angeles section of my report.

Hoboken Plant Inspection Station

This is one of the 14 stations with responsibility for clearing interceptions from the complex of ports and post offices around New York and the Hudson River up to the Great Lakes. The station is based in a substantial building that was originally built in the 1930s as an

insectory complete with a full range of fumigation and other treatment bath facilities originally intended for method developments associated with the quarantine services of the port.

As with the other stations the screening is confined to visual checks backed by intercepted entomology specimens for reference. In depth diagnosis is referred to either Research Specialists of the USDA or by contract to Cornell University. The volume of interceptions is declining with the trend to air cargo. Three hundred pathology and 900 entomology specimens checked the previous year. Samples noted were compost from Paraguay and, to my amazement, gorse seed, imported from Portugal. Seed is subject to X-ray checks. Their main goal is to prevent exotic introductions, and high hazard surveys are undertaken around the ports.

Of particular interest at this station were the Methods Developments team. They test and maintain an extensive library of treatments required for imports of plant material including fumigation tests on New Zealand kiwifruit. *Jim Fons* proved to be a helpful specialist whose staff of six are particularly concerned with fumigation for fruitfly and San Jose scale. A wide range of equipment for tests of nursery stock and crops, to determine both pathogen control and plant material tolerance, was observed. One responsibility is for atmospheric monitoring around fumigation facilities to check levels of methyl bromide, ethylene dibromide, etc. Other projects include dog training, to sniff out fruit and meat imports.

Their main function is to provide back-up data on treatments of fruit and meat for APHIS manuals.

Time was spent with *Doc Smith* one of only two Field Veterinarians of APHIS who monitor and control all the quarantine requirements for the imports of meat into the USA. Doc Smith is responsible for the Eastern Region. He identified hog cholera, swine fever, Rhinderpest and foot and mouth as the exotic diseases of particular concern with meat, and described the problems associated with the categories; fresh, chilled, frozen, in brine, and cooked.

A record of all quarantine queries - 2,000 in 2 years - and a study of common factors within the regulations had enabled him to prepare an operating reference table to guide all quarantine inspectors. This concept had been well thought through by a very astute specialist and the application could well be of interest to our Ministry veterinarians. The zones for meat imports were grouped into infected, suspect and free. For New Zealand exports, provided they are direct and sealed, he would support free entry, but if through a suspect zone and unsealed he would probably refuse entry.

SOME SIGNIFICANT EXOTIC PESTS AND DISEASES OF THE USA

The pests of particular risk to New Zealand were observed on the East Coast of USA. *Japanese beetles*, not unlike the New Zealand grass grub, were flying and being trapped in their hundreds by householders using a supermarket special, beetle trap. This pest has been intercepted at New Zealand ports of entry, and with its wide host range and damage to pastures, the need for our quarantine barrier is fully justified.

Bacterial ring rot had also been spread to one field of potatoes on Long Island through infected seed from another state. Every effort must be made to keep this disease out of New Zealand.

Colorado Potato Beetle was very active in the Long Island crops with both beetle and larvae greedy foliage feeders in the absence of insecticide protection. This pest has also been intercepted on arrival in New Zealand and has been the reason for repeated quarantine emergency control exercises in the UK. We must be equally prepared to respond should it breach our quarantine barrier.

On leaving Long Island I motored to Kennedy Airport to fly direct to London. On arrival at the airport there were beetles in the car after our field inspections. I subsequently expressed concern to the UK authorities that I had left the car, joined an aircraft and walked into Britain without so much as a warning about plant quarantine.

LONG ISLAND: POTATO CYST NEMATODE

The opportunity to compare New Zealand strategies for potato cyst nematode control with those of my hosts was a highlight of the study tour.

Whilst this experience has been separately reported, it should be noted that the New Zealand approach to the problem compared more than favourably for cost benefit and progress. My hosts were both enthusiastic and supportive for the policy we have developed. The basis for this has been published in a booklet based on eight years experience at Pukekohe.

The Lincoln College Foundation

One of the ways in which Lincoln College marked its centenary in 1978 was to establish a trust fund, the income from which was to be used for the furtherance of agriculture and related disciplines in New Zealand, by financially assisting individuals whom the trustees believed had valuable contributions to make.

The trust fund stood at almost half a million dollars by early 1982, and while the College itself has contributed a substantial proportion of this, donations have been received from many businesses and individuals - nearly all of them past students - from throughout New Zealand.

Awards are regularly given to a wide variety of applicants; in farming, horticulture, research, teaching, commerce, forestry, and fisheries. One of the conditions of the awards is the submission of a report, and the trustees are anxious that these should be made available to interested individuals and groups.

Sir William Dunlop
Chairman

Trustees:

Sir William Dunlop

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Mr S.M. Hurst, Chairman, Lincoln College Council

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Enquiries regarding the Foundation should be directed to the Secretary.