New Zealand Garden Journal

Journal of the Royal New Zealand Institute of Horticulture (Inc)

Xanthocryptus novozeelandicus

Searching the shadows: The photograph collection as a research resource and historical record. • Huperei - the black orchid
Genetic Engineering and food safety • Battling the bugs
Plant Profile: Lavandula multifida • Botanising by car in SW Cape Province, South Africa • Notable Trees New Zealand

Volume two, number three, September 1997

John R Templin Scholarship Trust

APPLICATIONS ARE INVITED FOR PRESTIGIOUS SCHOLARSHIPS IN ENGINEERING AND AGRICULTURE

Three awards available up to US$25,000 each

Applications invited from:

- Graduates in Engineering of the University of Canterbury;
- Graduates in Horticulture or Botany of Lincoln University;
- Graduates who have obtained National Diploma of the Royal NZ Institute of Horticulture, through the Reserves Department of the Christchurch City Council.

The scholarship awards may cover Post Graduate studies, the undertaking of research of merely practical experience. This must however be undertaken in the USA or Canada.

Scholarships are tenable for one year and may cover not only tuition costs, but accommodation, travel and associated expenses.

Any application must include conditional acceptance from the applicant's preferred choice of University or Institute, together with a full budget in support of the amount applied for.

For further details and application forms, contact:

Kelvin Glenn
NZ Guardian Trust
PO Box 9
Christchurch
Ph: 379 0644

Closing date: 15 November 1997

NEW ZEALAND GARDEN JOURNAL

Journal of the Royal New Zealand Institute of Horticulture (Inc)

Volume two, number three

September 1997

Editors
Mike Oates
Sarah De Renzy

Contributory writers
Walter Cook
Graham Harris
Rob Lucas
Alan Jolliffe
Barbara Hercus
Ron Flook

Advertisement sales
Mike Oates

Editorial Address
Box 28 040
WELLINGTON

(04) 479 4453

ISSN 1173 7425

The New Zealand Garden Journal is published by the Royal New Zealand Institute of Horticulture (Inc.) For membership information please write to RNZIH, Box 12, Lincoln University, Canterbury

Contents

Cover picture: *Xanthocryptus novozeelandicus,* the ichneumon wasp parasite of the lemon tree borer, *Oemona hirta.* A range of these relatively large showy insects are parasites of common plant pests, particularly caterpillars and beetles.
Photo: Rob Lucas.

Searching the Shadows:

The photographic collection as a research resource and historical record

by Walter Cook

Pictures are said to be worth a thousand words. In practice, in my experience, this aphorism of popular wisdom is not an unqualified truth. No doubt a photograph of Marilyn Monroe will describe her appearance at a particular moment in a way that words can't really emulate. On the other hand, written impressions and reminiscences of the actress by many people constitute a record which the image lacks and will only acquire through being associated with them. Together images and words are a powerful combination. In the presentation of historical events and personalities they compliment each other in our evocation of the past. Whether it is television or the stained glass of Chartres cathedral, images exist within a context of words, oral or written. Images and words combine in our thoughts, memories and dreams and both constitute and transmit much of that context of our lives called "culture".

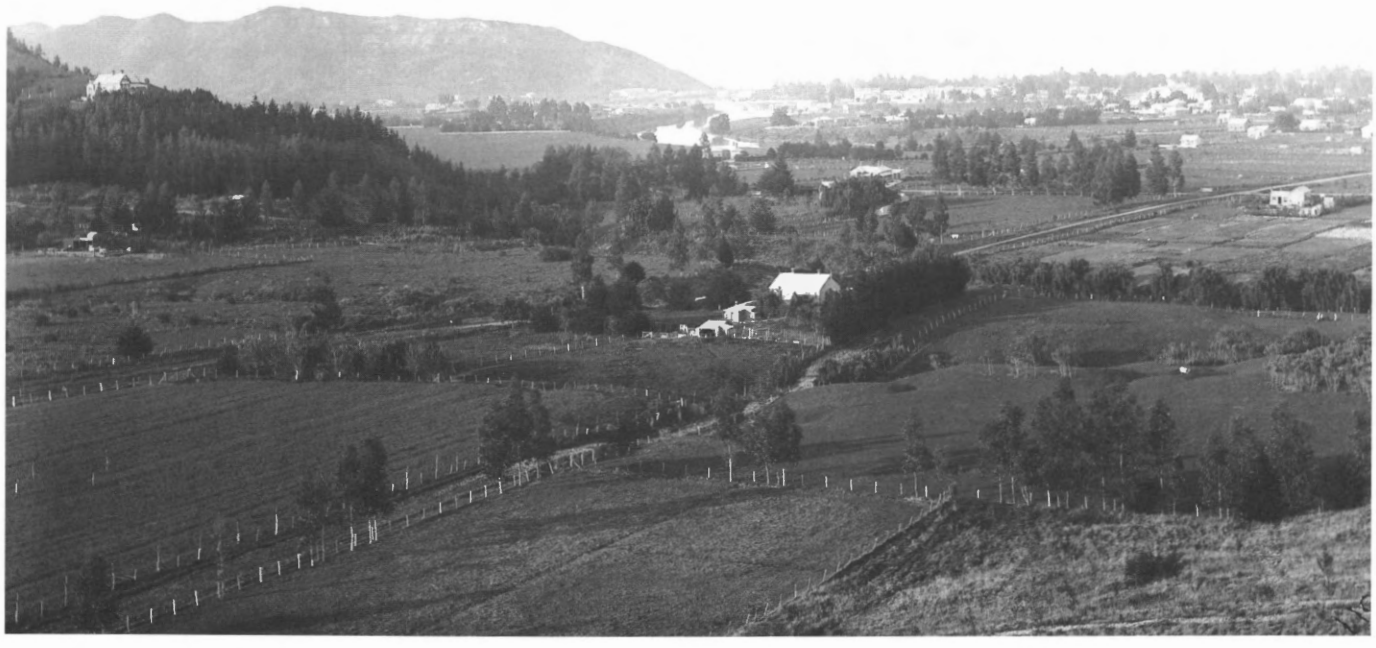
For this reason collecting images is an essential part of the work of those culture factories called research libraries. No country which considers itself advanced and civilised is without one or more of these institutions, and New Zealand is no exception. As well as our older established archives such as the Auckland Museum library, the historical collections of the Auckland public library, The Alexander Turnbull Library, the National Archives, the Canterbury Museum Library and the Hocken Library, there are dozens of others in national and provincial museums, universities and private institutions. The archaeologist, Leonard Woolley, found the "clay tablet" civilisation of Ur buried under eight feet of mud. Our civilization will be found buried under a mountain of soggy paper and the entangled plastic products of the information industry. Making sense of all of this is the work of an army of researchers, family historians, academic historians, biographers, television documentary makers, authors of newspaper articles, and museum exhibition curators — to name just a few. Research libraries fuel a huge and diverse industry.

To testify that images are an important part of our national archive nationally, I will simply state that when, four years ago, the Pictorial Reference Service of the Alexander Turnbull Library complied a directory of photograph collections in New Zealand, the resulting work contained one hundred and thirteen entries. These were selected from responses to a questionnaire sent to over 300 institutions and represented those which provided a service to the public. Archives of photographs exist in private industry, Government Departments, and bodies like historical societies. As well, every family and extended family is the possessor and guardian of such an archive. The family archive, as far as photographs are concerned, dates from the beginning of photography in the 1840s and 50s. For the first fifty years records were largely the work of commercial photographers though there are notable exceptions. The photographic image was delivered into the hands of us all when in 1889 Kodak invented and marketed the snapshot camera. Quite apart from their significance to owners, family photograph collections are a valuable source of information for social and cultural historians.

I work in the Photograph Archive of the Alexander Turnbull Library which contains the research collections of the National Library. These collections are quite distinct from the National Archives. The latter are the repository of records of government departments while the Turnbull Library draws its collections from the New Zealand community in general.

The core of the Turnbull Library consists of the rare books, records of early explorations, manuscripts and New Zealand publications, comprising in all some 60,000 items, collected by Alexander Turnbull and gifted to the nation in 1918. Images were a part of this collection including photographs. The library opened in 1920 and celebrated its first 75 years of operation in 1995.

Images in the Turnbull Library fall into three departmentalised groups. As well as the Photograph Archive, there is the Archive of Drawings and Prints. This collection contains pre-photographic images — the works of explorers, surveyors and artists who documented New Zealand and the South Pacific from the eighteenth century. As a generalisation it is the library's chief source of visual information prior to the mid 1860s when photographs became commonly used in New Zealand. Of course for a variety of reasons both the Archive of Drawings and Prints and the Photograph Archive contain material outside current collecting briefs, so for example you can see etchings by Piranesi, the 18th century Italian artist of architectural fantasy, in one, and wonderful mid 19th century images of the monuments of Egypt in the other — if you happen to know that they're there. The third department is the Ephemera Archive. This is a treasure trove of printed material which falls outside the briefs of all other departments. Trade catalogues, bus tickets, domestic packaging, posters, and junk mail — much of the print culture that touches most of us most of the time — ends up there. For garden historians it is one of the places to look for nursery catalogues, though sadly, I don't think it contains a comprehensive collection of seed packets (anyone out there wanting to off load such a treasure?). Material of interest to garden historians is diffused throughout all of these collections, and as anyone knows who has experienced research and research libraries, it takes time — first to



Views of Gisborne taken from Sievwright's Hill. 1885 and 1894. *Photographer: Daniel Manders Beere 1833-1909*

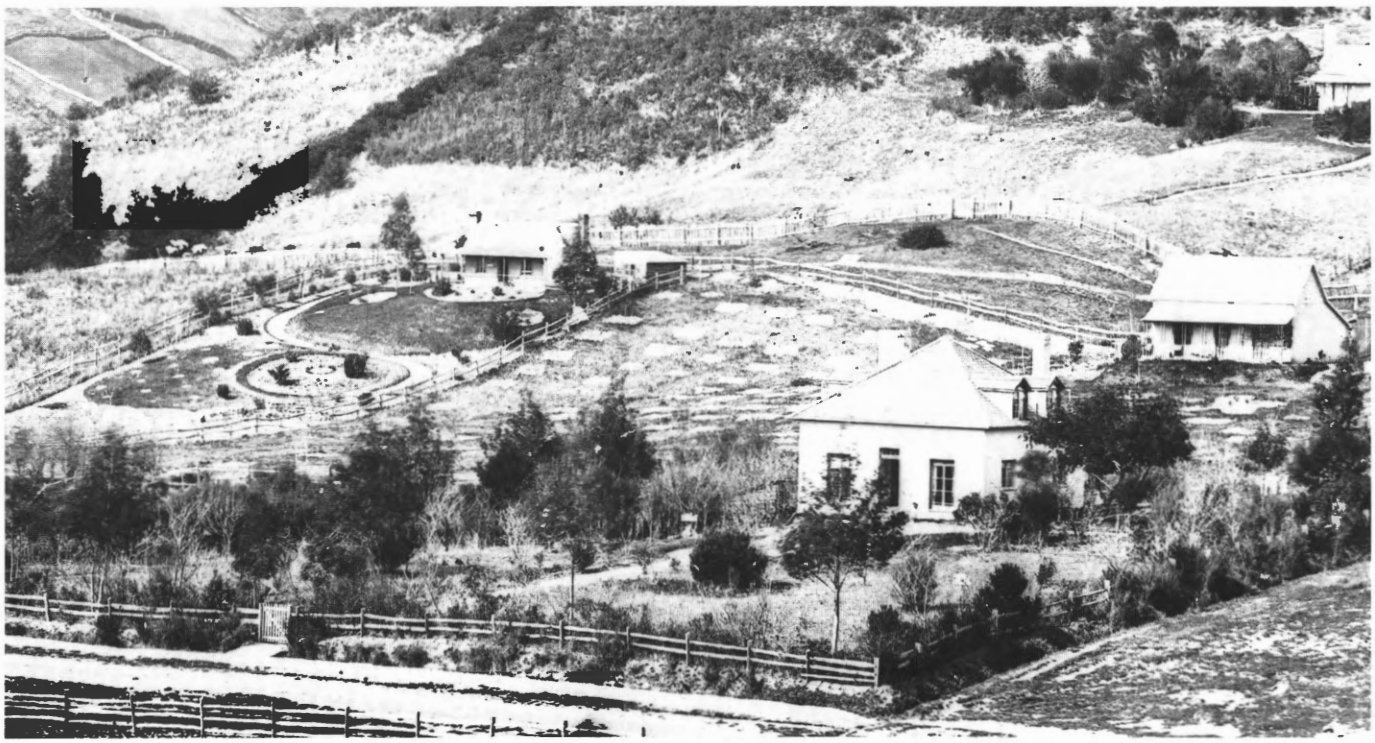
These photographs illustrate dramatically changes in the vegetation of the New Zealand pastoral landscape during the 1870s and 80s. In 1885 (top) the entire landscape of the view was planted with young trees. They comprised the new North American conifer, Pinus radiata, and the older standard shelter trees of the colonial landscape, weeping willows, blue gums and poplars. Ten years later (bottom) a new treescape had risen like a stage set from the landscape.

D M Beere Collection, Alexander Turnbull Library, Wellington, N.Z., Collection reference nos: G 96267 112 and G 96251112

The photographer William Williams (1859-1948) and his wife Lydia in the garden of their Napier house, ca 1886.

This is an example of a family photograph before the snapshot camera. William worked as a stores clerk in the railways and was also one of the best New Zealand photographers of the time. Among other family records, he took a series of photographs of this garden which included his wife and their friends using and working in it. Camera technology of the 1880s still required pictures like this to be set up, so the people are posed. As a result such photographs are more works of artifice than incidental records. Even so this photograph contains a lot of information about the garden including many identifiable plants, and a clear statement of its undifferentiated arrangement of the useful and the beautiful. Out of records such as these the modern myth of the New Zealand "cottage" garden has been created in recent years.

E R Williams Bequest, Alexander Turnbull Library, Wellington, N.Z., Collection reference no: 0 25678 1/1



Detail from a 10 by 8 inch glass negative of Nelson looking south-east towards Sunnyside showing houses and gardens ca 1858 Photographer William Meluish 1823-1888.

This is a blow-up of a 9 by 4 cm section of a large format glass negative. In comparison to modern 35mm negatives this is still a large negative area. Given also that the grain of the emulsion is very fine it would be possible to enlarge this negative section to A3 size and still have clear definition of details. In this way much garden and landscape information can be explored and extracted from the background of larger images.

Meluish Collection, Alexander Turnbull Library, Wellington, N.Z., Collection reference no : G 1117 10 x 8.

know the way the institution works and then to ferret out specific information. But believe me, we're there to help you. Don't give up! Keep pestering. If we haven't got it, we'll suggest other places for you to try.

The collections of the Photograph Archive began as a result of the New Zealand Centennial publication "Making New Zealand", a serialised history of this country from Gondwana to 1940. Photographs collected for this publication were subsequently deposited in the Turnbull Library. Then in 1947 the first photograph curator, George Heron was appointed. Heron was an enthusiast rather than a professional librarian. With the help of supporters of the Library like the Petone photographer A P Godber, he identified and sought out historical photograph collections. Though Heron left in the early 1950s, the library continued to reap the reward of his efforts into the 1960s. Collections such as the Tyree Collection from Nelson, the Steffano Webb Collection from Christchurch and the Harding Denton Collection from Wanganui are examples. Collectively they cover a period from 1863 to 1933. The Harding Denton collection in particular is a good example of a continuous record, in this case of Wanganui, which is of great use to garden and landscape historians. From 1863 to 1933 the city was sequentially photographed. Back-yards of colonial buildings can be examined for vegetable gardens and shelter trees. The earliest pine plantation in the city was planted in the early 1870s round the new court house. It's rise and fall can be followed in the photographic record as it was transformed into the gardenesque plantings of the notorious Moutoa Gardens from the late 1890s. Street plantings, other public and private gardens, and the treescape of the city have been clearly captured in this collection. It is an outstanding record for anyone wanting a general view of what really happened over a particular period. Collections relating to other places may not come from a single studio, but the Turnbull Photograph Archive and Pictorial Reference Service, contain a critical mass of material which makes such explorations feasible for many of our cities and towns as well as for country areas.

Today the photograph collection comprises some two million items and continues to be well supported by the community. 70 to 80 per cent of acquisitions over the last two years have come from public donations. Much of the balance is made up of copy negatives made from items loaned for copying. And what are we doing about all this material? We are all pounding away at computer keyboards these days, and in the near future access to cataloguing records will be available nationally and internationally through netscape. Already over 2,000 images and their documentation, are available nationally and world wide through the Timeframes database, which has been noticed and favourably commented on by American research watch dogs on the internet. In future anyone with the appropriate technology will be able to do preliminary searches of the Turnbull Library holdings in postmodern isolation, from their homes. But for the rest of us — don't despair. We will always respond to letters, and send photocopies in the absence of more advanced technology. Also we are open to anyone visiting Wellington, weekdays between 9 am and 5pm. There is nothing like experiencing the real thing. There is also the advantage of serendipity through contact with those who know the collections — something that is hard to effect from a distance.

All images constitute a primary resource for research. This is not always recognised by researchers who often select images as illustrations at the end of the job. They are used more as embellishments to a text rather than an integral part of its message. Many of the same images are used over and over again because authors and publishers make selections from published sources. As a result certain images can become icons representing a point of view or set of prejudices. An example of this is a photograph of an overcrowded Victorian interior in the Turnbull Library collections. I first saw it in "Making New Zealand", published in 1940. It was used in that publication and subsequent ones by propagandists of the modern movement in domestic design to illustrate "bad" Victorian interior design. In fact this is the only image among many 19th and early 20th century house interiors in the collections that looks like this — and it is completely over the top. The selectors had also misread the image, which is in fact an example of the way some proud home owners of the time gathered their possessions en mass, in front of the camera — hence the unique clutter. Images in isolation can be easily manipulated, and developing skills in reading images requires, at least, relatively open minded foragings among a critical mass of them, as well as information from published or manuscript texts.

Images generally, and photographs in particular, do have limitations, even in critical mass. These result from how we use photographs, who takes them, and who pays for them — the socio-economic factors. Views of cities in the 19th and early 20th centuries were usually taken by commercial photographers for sale as prints or postcards. They usually chose parts of the town where the principle buildings were, or the more affluent suburban areas whose inhabitants ensured a market for their products. In Wellington, for example, we have relatively few photographs of the working class areas of the Te Aro Flat which were considered unsightly slums, given over to the City Mission, the down market end of the sex industry, and opium smokers. This means garden historians interested, let's say, in the incidence of vegetable gardens in this part of Wellington, don't have the mass of material to work with that is available for Thorndon. It is easy to find information on the gardens of the middle classes and public parks. That's where the money was in terms of tourists and clients. The same is true of the family snapshot collection. We point the camera to record significant rites of passage, summer holidays, and members of the family. As a result we are as selective in our own way as commercial photographers. You probably wont find pictures of mum bottling or cleaning the Shacklock stove in the kitchen, or of dad giving the kids a hiding. Thus with gardens it is easy to find views of the finished product. Detailed records of nurseries, people working in glasshouses behind the scenes, or gardens in the process of construction are rare or non existent.

The photograph collection in the Turnbull Library that illustrates this monumentally is the recently restored R P Moore collection of panorama negatives. This consists of 2,400 meter long nitrate negatives taken between 1922 and the

early 1930s. As well as being a spectacular record of New Zealand towns, cities, and landscape, for garden historians, the collection contains dozens of photographs of great houses and their gardens, all depicted in amazing detail. Photographic records such as these were expensive to buy, and this dictated who bought them and what was recorded. Panoramic prints by R P Moore are not uncommon. Rupert Tipples used a number to illustrate gardens created by Alfred Buxton in his book "Colonial Landscape Gardener". The landed gentry who employed Buxton to design and lay out their gardens, were also a significant class of patron who supported Moore as a panorama photographer. Conspicuous consumption demands conspicuous display. The panorama photograph was one way to effect this. The library is in the process of making high quality copy negatives from the originals, and many have been printed for use as a reference tool for people using the library. The originals are now kept in a refrigerated store which will prevent the nitrate film from deteriorating.

Records such as those that survive in the negatives of R P Moore are also of use for the restoration of gardens — identifying surviving trees from original plantings and getting an idea of what the garden looked like. The photograph Archive contains five 10 x 8 inch glass negatives of Nelson dating from ca 1858. They record views of the young city from a slightly elevated position looking down on the buildings in the landscape. Fruit trees, gardens, hedges, and other details can be clearly seen. They contain a lot of general information about gardens in Nelson at that date, and from this information, history and restoration can draw solid conclusions. In the case of negatives of large format such as these, there is also potential to explore the image by having sections blown up. It has always been possible to do this using conventional photograph printing methods, but these were relatively labour intensive and expensive. New electronic methods of producing images make this much easier and cheaper to do. Images can be scanned from negatives on to computer discs, and electronically cropped and enlarged and printed out as laser prints or digital photographs. Of these, the laser prints are the cheapest option ($ 5.60 as against $ 16.65), and done this way provide very clear images. The limitation of laser prints is that they are not the best image to publish from. Unlike photographic prints they are constructed of thousands of parallel lines and for some reason this causes degrading in the images taken from them - the sort of thing that happens much more dramatically when a photocopy is made from a photocopy.

Research libraries have a double agenda which is always the cause of some conflict. They must provide access to collections which are there to be used, but they must also make sure that the collections are used in such a way that they survive. The use of many new technologies, like the digital storage of images, are also motivated by considerations of conservation. Copy negatives made from the R P Moore negatives allow the originals to be retired, and also transfers the image onto a more stable film base for the long term. Because the copy negatives are smaller they can be used in standard photograph printing processes and images from them can be easily supplied. Conservation at a basic level permeates everything we do in the Photograph Archive. Incoming collections are checked for live stock on arrival. In the eternal summer of controlled, air conditioned interior climates insect pests can take off with a vengeance. Humidity within the building is kept at 32 which effectively deals with moulds, and when combined with low temperatures slows down the processes of chemical decomposition in papers and photograph emulsions. It is not so good for living human beings who can suffer a range of discomforts as a result of the dry atmosphere — feeling drained and tired being one of the more common. Collections are finally packaged and housed in acid free envelopes and containers which will not exacerbate the previously mentioned processes of chemical decomposition by joining them. They are then catalogued and shelved in a numbered sequence from whence they are retrieved for the use of us all who own them. Don't forget this. Collections such as those in the Alexander Turnbull Library have been built up over the decades by personal contributions and the spending of public money. They are there for the use of all of us.

Huperei - the Black Orchid

Graham Harris

Natural Resources Centre
Te Wahanga Matauranga Rawa Whenua
The Open Polytechnic of New Zealand.

Fig. 1. Gastrodia cunninghamii flowers. *Photo: Rob Lucas*

The paper outlines the occurrence and biology of Huperei, *Gastrodia cunninghamii* , and examines the significance of the plant to Maori.

Huperei or the black orchid *Gastrodia cunninghamii* is a leafless orchid which bears flowers from November to February. Fifty or more flowers are borne on a single stem which can reach 1 metre in height. The flowers have short stalks and are about 15 mm long. They are purplish brown with mottled pale raised calluses on the outer surface and the inside of the flowers varies from cream to white. The flowers are tubular with 5 lobes and the labellum which is enclosed in the tube, is much longer than the column which supports the anther. The scent of the flowers has been described by some as unpleasant and by others as sweet. The orchids store nutrients in starchy underground rhizomes which may be up to 250 x 50mm. The rhizomes which lack roots have obvious remnants of scale leaves. The rhizomes may be up to 600mm below the soil surface.

Occurrence and distribution.

Huperei is found throughout New Zealand in lowland forest and shrub land. Moore and Edgar 1970:158 record that it is "not uncommon in dark shaded places but easily overlooked." They note that its range has not been fully recorded. The author has recorded numerous specimens growing in the Akatarawa valley near Upper Hutt. Most were found growing in deep shade near or in the vicinity of hard beech *Nothofagus truncata* however they were also found near Kahikatea *Dacrycarpus dacrydioides* and putaputaweta *Carpodetus serratus* in places where *Nothofagus truncata* was not present.

A Symbiotic Association

Huperei lacks leaves and chlorophyll and receives nutrients through a complex symbiotic association with a fungal pathogen (*Armillaria novae-zealandiae*), parasitic on the roots of a wide range of forest trees. This association is detailed by Campbell 1962. The summary to this paper records:

> "*The orchid* Gastrodia cunninghamii, *lives in association with the fungus* Armillaria mellea, *itself a parasite on the roots of forest trees. Of the three methods by which infection takes place the most important involves penetration of the basal rhizomes by fungal rhizomorphs proceeding from within the root of an adjacent tree. Fungal cytoplasm released into the cells of the digestive layer of the rhizome provides nutriment for the orchid which lacks both roots and chlorophyll.*"

Armillaria mellea referred to by Campbell, is now classified as *A. novae-zealandiae* (Pennycook 1989:37) who refers to *A. mellea* as a European species not known in New Zealand.

Although *Gastrodia cunninghamii* appears to be most

commonly found growing near *Nothofagus* species it is also found growing where they are absent. Moore and Edgar 1970:158 note that most specimens are found in *Nothofagus* forest but that it also occurs on Mt Egmont, the Chatham Islands and Stewart Island where *Nothofagus* is absent. It appears that the plant is not confined to growing in or in the vicinity of native forest or in deep shade. Given 1959:4 recorded *Gastrodium cunninghamii "growing in alluvial soil on the riverbank close to the trunks of willows. The nearest native forest was some miles distant..."* These plants were growing near Takaka.

Pennycook 1989:37 lists a range of plants recorded as being hosts of *Armillaria nova-zealandiae* including matsudana willow *Salix matsudana*. It is possible that *Gastrodia cunninghamii* could have as many associations as *Armillaria nova-zealandiae*, its host fungus.

Significance to Maori

The rhizomes of the *huperei* or *perei* were eaten by Maori and were regarded as a delicacy. They are described in Riley 1994:332 as being not unlike small kumaras, with a slightly sweet taste, They were cooked in a *hangi* or roasted in the embers. Colenso 1880:31 noted that the rhizomes were eaten but that they were scarce and only found in dense forest. Similar information is provided by Tregear 1926:99 in writing about traditional food sources of the Maori. He also describes the rhizomes as resembling a long red radish root. He agreed with Colenso that the root was valued, scarce and only found in dense forests. Hammond 1894:238 describes *perei* as like the *taro* in colour but the *kumara* in shape and that the tubers were from three to eight inches in length. He noted that the plant was quite common before the introduction of pigs.

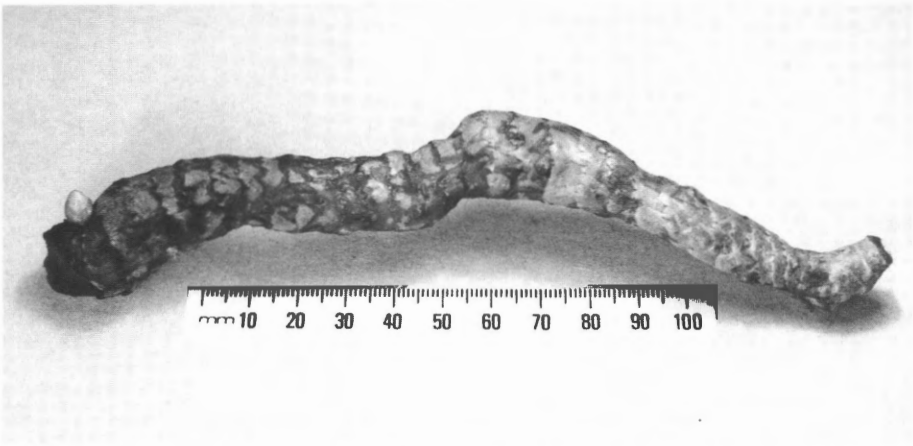


Fig. 4. A Gastrodia cunninghamii rhizome. Note the remnants of scale leaves. Photo: Graham Harris.

There appears to be no references to medicinal properties of the plant, however Colenso 1868:261 referred to the roots as containing "salep" which is described as a food or drug prepared from dried orchis roots. (Grieve 1995:1) A related plant, *Gastrodia elata* from China contains gastrodin which has sedative, hypnotic and antispasmodic properties.

Maori must have gone to considerable effort to obtain *huperei* rhizomes as they were often found up to 600mm below the soil surface amongst tree roots in compacted soil. Campbell 1962:289-290 describes the difficulty in excavating rhizomes from beech forest in Fiordland and from mixed rain forest in South Westland. She recorded that many attempts to excavate rhizomes failed due to the compact nature of the soil and the very brittle rhizomes which were interwoven with a mass of tree roots.

According to Maori tradition the *huperei* or *perei* was not a plant of the earth but a creature of supernatural beings (Riley 1994:332) and there were many superstitions relating to it. The plant was supposed to understand the Maori language, so those who went to dig the rhizomes used the substitute name - *maukuuku* to ensure that the huperei did not hear its name and disappear. *Huperei* was also known as *uhiperei* while the rhizomes were referred to as *para* or *paratawhiti*. (Beever 1991:17)

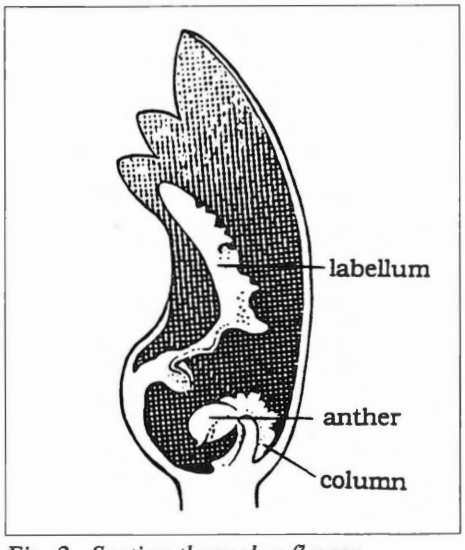


Fig. 2. Section through a flower

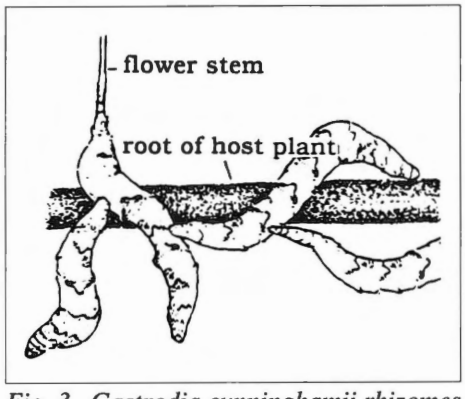


Fig. 3. Gastrodia cunninghamii rhizomes

Acknowledgement

The author acknowledges the technical advice and the photograph provided by Rob Lucas.

Refl erences

Beever, J. 1991., *A Dictionary of Maori Plant Names*. Auckland: Auckland Botanical Society. Bulletin 20.

Campbell, E.O., 1962. The Mycorrhiza of *Gastrodia cunninghamii. Transactions of the Royal Society of New Zealand. Botany.* 1:289-96.

Colenso, W., 1868. Geographic and Economic Botany of the North Island of New Zealand. *Transactions and Proceedings of the New Zealand Institute*, 1:232-83.

- 1880. On the Vegetable Food of the Ancient New Zealanders. *Transactions of the Royal Society of New Zealand*, 13:3-38.

Given, D.R., 1959. An unusual occurrence of *Gastrodia cunninghamii* Hooker. *Auckland Botanical Society Newsletter* 16 (3).

Grieve, M. 1995. Orchids. In A. *Modern Herbal. Homepage.* Available: Internet. URL Http:// www.botanical.com/botanical/mgmh/o/orchid13.html

Hammond, T.G., 1894. The Kumara, Perei, and Taewa. *Journal of the Polynesian Society,* 3:237-38.

Moore, L.B. and E Edgar., 1970. *Flora of New Zealand. Volume 2.* Wellington: Government Print.

Riley, M. 1994., *Maori Healing and Herbal. New Zealand Ethnobotanical Sourcebook* Paraparaumu, New Zealand: Viking Sevenseas.

Tregear, E., 1926. *The Maori Race.* Whanganui: A.D.Wills.

GENETIC ENGINEERING AND FOOD SAFETY

"Genetically Engineered Crops: Environmental and Food Safety Issues", a recently released Royal Society paper, assesses the advantages and risks of genetic engineering, looks at common misconceptions about the technology, outlines the legislative framework and looks at public perceptions of food safety.

The author is Dr Tony Conner, a biotechnologist with Crop & Food Research and Lincoln University. He says genetic engineering techniques have potential to improve crop plants in a very precise, specific and rapid manner compared to traditional plant breeding.

The three main characters engineered in crops world-wide are improved resistance to viruses, insects and herbicides.

Other characters being worked on include;

- bacterial and fungal resistance,
- male sterility and fertility (usefull in hybrid seed production),
- chilling and freezing tolerance,
- altered pigmentation,
- delayed fruit ripening and
- improved post-harvest storage, flavour and nutritional quality.

For genetically engineered crops, traditional genetic manipulation via plant breeding must be the key reference point in assessing the perceived risks, Dr Conner says.

"Plant breeding, conventional agricultural practices, and existing situations in nature which have been considered acceptable for many years, have similar risks to genetic engineering," he says.

"Compared to traditional methods of plant breeding, the precise manner in which genetic engineering can control the exact DNA makeup, and the way in which the transferred genes are expressed, offers greater confidence for producing the desired outcome."

He says in genetically modified plants only a few genes are transferred and their expression products are generally well known. This contrasts with traditional cross breeding where many more genes are transferred to the new plant, including undefined genes with unknown effects.

Confidence in process:

Furthermore, if a gene has been transferred via genetic engineering then it will be well understood at the molecular level, he says. Very sensitive methods can be used to monitor the presence and expression of the gene, so genetically engineered plants can be monitored much more effectively than other cultivars.

This means research being done on a food containing toxic or allergenic compounds, these compounds are more likely to be identified if it is derived from genetic engineering rather than from traditional plant breeding, he says.

However, all cultivars - both traditionally bred or genetically engineered -must be extensively tested and screened prior to commercial release. "Over the long history of plant breeding this has enabled unacceptable lines to be identified and discarded."

Environmental issues:

On the environmental front, Dr Conner also does not believe that genes from genetically engineered plants will 'jump over" to weeds thereby creating a super-weed. He points out that herbicide-resistant cultivars can also be developed by traditional methods of crop improvement. Specific cultivars of wheat, maize, oilseed rape, soybean, and tomato are already resistant to specific herbicides without the use of genetic engineering, he says.

"Managing the development of weed populations with resistance to herbicides is an existing problem from which important lessons have already been learned.

"It is well recognised that in certain combinations of crops and herbicide resistance, the risks can outweigh the benefits."

Risk management:

Risk assessment of genetically engineered crops should proceed on a case-by-case basis, with regulatory agencies initially maintaining a conservative approach, he says.

People have become alarmed about aspects of genetic engineering because they are frequently exposed to inaccurate and misleading technical information, Dr Conner says.

Myths exposed:

An example of this is the frequently-quoted case of 37 people in the United States dying after eating an L-tryptophan diet supplement manufactured using a genetically modified organism. However, that problem was attributed to a contaminant introduced during subsequent extraction steps rather than the new genes introduced through genetic engineering, he says.

The same contamination would be expected if that purification procedure was used for L-tryptophan extraction from non-genetically engineered bacterium.

High NZ awareness:

Dr Conner says two New Zealand studies (Couchman & Fink-Jensen 1990; and Macer 1994) have shown a high level of awareness (about 80%) that genetic engineering was being used to produce food and medicine.

"When asked how concerned they were about the use of those foods and medicines, the highest level of confidence was expressed in medicines and vegetables: around 65 % of the respondents had few or no worries about using them."

"Genetic engineering is one of a large number of food risks. Relative to other risks, genetic engineering is rated very low by experts, but higher by the public because of fear of the unknown," Dr Conner says.

"Genetically Engineered Crops: Environmental and Food Safety Issues" costs $12 and is available from the Royal Society, P0 Box 598, Wellington.

Battling the Bugs

Over the last three years Rob Lucas from The Open Polytechnic of New Zealand has been working with Wellington Parks staff to develop integrated control programmes aimed to minimise pesticide use. Here he outlines some of their recent initiatives and results.....

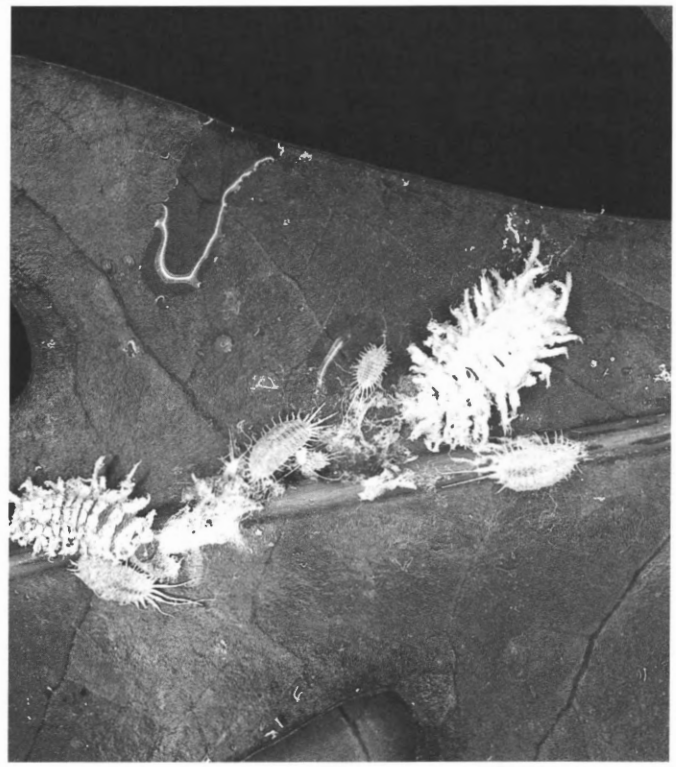


Fig 1. Cryptolaemus larvae feeding within a mealy bug colony. Note the superficial resemblance of the predator to its prey. Young cryptolaemus in particular may be easily confused with mealybug

In 1994, partly in response to increasing public concern over pesticide use in public places, the Wellington Parks Department commissioned a report[1] on the current status of pesticide[2] use and storage within their work facilities. Consequently the following report recommendations were adopted:

1. To minimise pesticide use and actively pursue alternative control systems wherever appropriate, and

2. To restrict the use of pesticides to those registered as Harmful Substances or of Low Toxicity.

At present our pest control strategies are based on the following premises:

- To develop and employ all feasible practical alternatives to pesticides
- To develop monitoring systems which ensure pesticides are used only when necessary
- To minimise hazard by using only pesticides rated as Harmful Substances or, preferably, Low Toxicity[3].

There have been three areas where major initiatives have been undertaken to minimise all pesticide use. These are:

- Begonia House Conservatory,
- Lady Norwood Rose Garden, and
- Wellington Botanic Garden Nursery.

The Begonia House Conservatory

The conservatory has long been a problem area for pests and pest control . Previously a range of pesticides were employed to control the major pest species of scale, mealy bug, whitefly and twospotted spider mite. The latter two species in particular were the most common and caused the most plant damage. Routine pesticides treatments were used to keep pest numbers under control. However these are always difficult to use in areas of heavy public use such as the conservatory, and given the present level of public concern over pesticide use, almost impossible to justify. At best, pesticides create an unpleasant environment and they are always a potential hazard to the public, even when applied with great care.

An ironic outcome of the regular pesticide use was that several ornamental plants showed severe flower damage caused by the very treatments applied to 'save' them from pests. In some cases, the damage invoked by the 'cure' was on a par, or worse, with the potential disfigurement caused by the complaint.

Today pest control within the conservatory is based around the biological control agents *Phytoseiulus persimilis* - a predator mite and *Encarsia formosa,* a parasitic wasp. Both control agents are commercially available; phytoseiulus as **Mite-E Predators** and encarsia as **Enforce**. This allows us to purchase stocks and release them whenever they are needed - a technique called *augmentation* .

1. Pesticide report for the Wellington City Council Parks Unit of the Culture and Recreation Division; Mike Burtenshaw and Rob Lucas. The Open Polytechnic of New Zealand. 1994.
2. Now for some obscure reason officially (and unhelpfully) termed Agrichemical.
3. Such pesticides are generally considered to represent very little potential hazard and are safe for home garden use.

Commercial availability is a key aspect of pest control with natural control agents as it allows populations of control agents to be 'topped up' as needed, thus minimising the chances of pest population explosions if the control agent declines or dies out. There's also a further benefit in being able to augment populations. In practise it can be quite difficult to accurately define the optimum time and quantities needed for successful release of a control agent. Regular releases during the critical period helps ensure that the control agent establishes at the best time and in numbers which are likely to give satisfactory control.

Initially we concentrated on controlling two spotted spider mite with the predator mite, *Phytoseiulus persimilis*. This predator is a voracious hunter and we found that pest mite populations were reduced to non damaging levels within eight weeks after initial releases in February when pest levels were very high. Although *Phytoseiulus* exerts control very quickly, it can easily eat it's way out of a future by killing off all prey. However, it is an easy predator to handle, is not particularly fussy about threshold levels of pest, (although for optimum results it's always best to release it before pest numbers are at very high levels) and under the environmental conditions prevailing in the conservatory, is very effective and reliable.

But as all horticulturists soon learn, life with pests is never a simple direct process of cause, cure, problem solved. We soon found that killing off one pest often just makes space for another problem to take over the territory. Almost before we had finished celebrating the apparent demise of two spotted mite, the whitefly moved in.

Released from the bondage of heavy mite populations, plants such as frangipanis responded with copious clean growth. We were amazed at the response. Never had our frangipanis looked so clean with not a drop of pesticide to mar the surfaces of leaves! Then, in came the whitefly, obviously attracted by the fresh clean growth. So, we potentially had a greater problem than before because whitefly pose a more severe control problem than two spotted mite.

Successful control with encarsia depends upon releasing the wasp at just the right time - and in appropriate densities - when numbers of adult whitefly are **VERY** low. The wasp is released by placing small cardboard squares or 'tags' of parasitised whitefly larvae on infested plants. Each tag holds about fifty parasites and staff use one or two tags per plant. We release encarsia weekly and target whitefly sensitive plants. It's essential to start early. We start in spring when the first adult whitefly is seen and follow up with ten releases at one week intervals.

It's probably fair to say that initially staff were not aware how critical early release and appropriate density are to the success of whitefly control by encarsia. It is also very important not to tilt the balance in favour of the pest by introducing more infested plants into the conservatory once the wasp has been released. So, for a couple of uneasy years, we had to undergo a steep learning curve, during which the whitefly came and went. Unhappily (at the time) more often came than went. However, we now have a better understanding of how season, day length, temperature, plant condition and cultivar sensitivity are likely to influence whitefly numbers. This allows us to plan encarsia releases when they are likely to have maximum impact and to avoid creating favourable conditions for the pest.

We are finally starting to get it right. Last summer, staff released encarsia into sensitive plants at appropriate times and whitefly never became a problem. Mind you, this is **NOT** to suggest that the same happy state of affairs will extend into the next summer! We will just have to wait and see.

You may think that, having successfully controlled the whitefly and the mite pests, our problems should be over. Not a hope. Last year populations of mealy bug built up to unacceptable levels. Currently we are using an experimental scarabid beetle, *Cryptolaemus montrouzieri* to help control mealy bug. Results have been mixed. The beetle appears not to function well in the conservatory over the winter period when temperatures are cool and photoperiod is short, although results have been promising over the warmer months from November until April. Unfortunately our experience has been that it appears to work best when plants have moderately high mealy bug populations. Obviously, we can't accommodate the predator in that regard!

Cryptolaemus larvae pose another problem for untrained staff too. They look rather like their preferred prey, the mealybug. (Fig 1). Staff need to be trained to ensure that they can tell the difference.

So for mealy bug we are at present integrating several strategies:

- Depressing mealy bug populations with the use of the Low Toxicity growth regulator pesticide Applaud,[4]
- Releasing *Cryptolaemus* at intervals during late spring until early autumn.
- Rigorously checking introductions of plant material to the conservatory
- Spot treating limited outbreaks with methylated spirits.

Two other pests, brown soft scale and a thrip have developed alarmingly over the last eighteen months.

Some control of scales is reputed to be possible with Applaud and *Cryptolaemus* . To date we have seen little evidence of brown soft scale being significantly contained by

4. Applaud is not the final solution. It is toxic to *cryptolaemus* so cannot be applied where the predator is working and must be restricted to four sprays per year in order to minimise resistance developing within the pest populations.

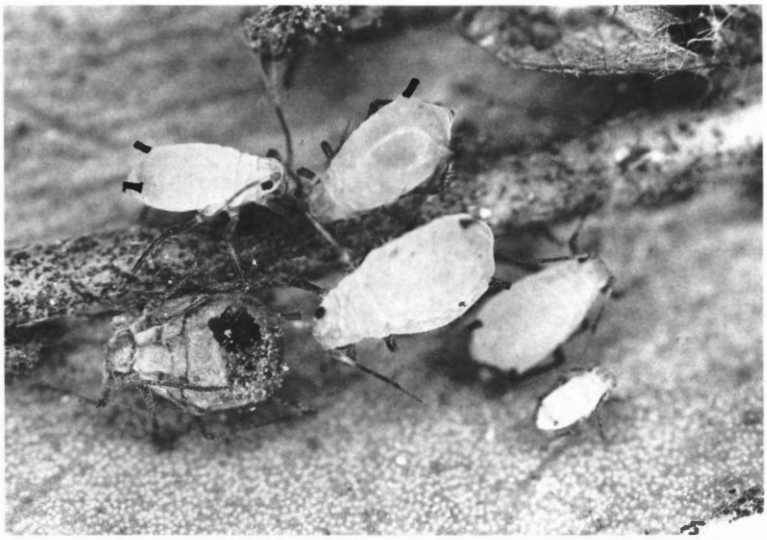


Fig 2. The mummified body of a parasitised aphid (bottom left). The exit hole bored by the hatching adult wasp parasite can be clearly seen at the rear of the abdomen

either agency. At present we control both scale and thrips by applying non toxic mineral oil sprays and roguing out badly infested plants or plant parts. We have found that mineral oil sprays can be effective - if applied diligently every ten days. However, you do have to be very conscientious with regularity and thorough coverage.

Aphids appear from time to time in basket plants and mostly in spring and summer. Sparrows[5] have been seen enjoying a feed of aphids amongst the basket plants and a regular hose-down helps deter aphids from developing excessive population densities. When control is necessary, aphids are usually dealt to with oil or fatty acid sprays. Minute parasitic wasps (Aphididae) often occur spontaneously amongst aphid populations (Fig 2) and certainly help depress populations. But you can't have your cake and eat it too. If it looks as though a wasp is likely to control aphid numbers it pays to leave well alone. Even relatively innocuous sprays such as fatty acids and oils may damage parasitic wasps, especially before deposits have dried.

Finally, caterpillars (leaf roller and green looper) appear from time to time. Satisfactory control is achieved with the bacterial toxin pesticide, *Bacillus thuringiensis* (**Bt, Dipel, Thuricide**). This pesticide has a Low Toxicity rating.

The Lady Norwood Rose Garden

The rose garden has posed some particularly interesting control problems. Roses, by their very nature are always going to be troublesome. Many cultivars are very attractive to pests and pathogens and have minimal pest and disease tolerance, so are quickly disfigured. Probably more than any other horticultural plant, roses epitomise the horticulturists dilemma: what strategies can we employ to cope with poor pest and disease tolerance in order to meet public expectations of high quality rose displays based on a growing regime of minimal pesticide inputs and minimal environmental and public hazard?

Because of the necessity to continually protect growth with pesticides throughout the season, the pesticide phase of the strategy must for the present continue to take central place. Ideally the rose garden pesticides must be

- Effective
- Low toxicity
- Non phytotoxic
- Compatible (with other pesticides used and with any natural control agents likely to be present), and
- Unlikely to create resistance within the target pest population with repeated use.

In reality, these ideals cannot yet be fully met. Our disease control spray programme this year was based on the fungicides Saprol (triforine), Pallinal (metiram + nitrothal-isopropyl.) , Super Six (sulphur) and Systhane 40W (myclobutanil). All these materials are classed as Low Toxicity except Saprol, which is a harmful substance. Saprol and Systhane although very effective, are DMI fungicides[6] and may incur the development of resistant strains with continual use. Consequently, the total DMI applications per season should not exceed four.

Most pests were controlled by a Low Toxicity formulation of Decis (deltamethrin). Twospotted mite were controlled by Pentac (dienochlor).

The diseases: Last season we based the disease control programme around the two protectant fungicides Super Six and Pallinal. At times when the roses were likely to be subjected to high disease stress a DMI fungicide was combined with sulphur. Our experience was that although both combinations appeared to control the diseases effectively, the Systhane/Super Six combination caused severe leaf burn to several rose cultivars whereas the Saprol/Super Six combination did not.

This year nineteen sprays were applied between early September and late April. Diseases in all beds were well controlled except for several beds badly infected by black spot in late February.

Many beds showed very little infection from foliage diseases. In some beds, the main cause of leaf hardening and disfigurement were the pesticide applications themselves.

The pests: Thankfully, a previous year's monitoring the Norwood roses[7] had taught us that although diseases (rust powdery mildew and black spot) are a continual threat to rose health, pests are not. Or that's what we had thought. This year, the story was very different. Aphids occurred in spring in

5. Although not exactly welcome residents, sparrows can be beneficial having also been observed feeding on mealybug and green plant hoppers. We don't know how significant sparrow predation is as a means of reducing pest levels.
6. Demethylation inhibitors - a chemically diverse group of pesticides with a similar specific mode of action.
7. Survey of rose performance in the Lady Norwood Rose Garden; Warren Kerrvish (Parks Department) and Rob Lucas, June 1995.

several beds and required treatment with Decis (deltamethrin). (Previously we had relied solely on a mineral oil for aphid control, applied in combination with the regular fungicide treatments. This year we couldn't use oil because it is incompatible with the protectant fungicides Pallinal, and Super Six. This exemplifies the state of eternal juggling which inevitably accompanies complex control programmes.

But the major surprise of the year was the rapid development of twospotted spider mite. Normally under Wellington conditions, spider mite does not become a significant problem until late summer, if at all. This year, populations multiplied very rapidly during the warm humid weather prevalent during December and January. Three applications of Pentac (dienochlor) were required to some beds during late January and February before control was attained. Many rose beds later spontaneously produced high populations of predator mites on leaves in late March.

Next season: our aim is to reduce pesticide applications where possible, without lowering floral display standards. We intend to achieve this by:

- **Classifying beds into two groups:** From what we have observed this season and in 1995, we know that some beds (each bed contains one cultivar) appear to be far more disease tolerant than others. So, beds will be tagged as either requiring regular sprays or requiring spraying only when observations show evidence of infection. The first category of bed will be routinely protected with pesticide; the second group will not be sprayed unless observations show this to be needed.

- **Monitoring beds:** Beds known to be particularly sensitive to a pest or disease will be checked weekly. Others will be checked every two weeks.

- **Reducing pesticide applications:** Pesticide applications will be reduced from the nineteen delivered last season to twelve or thirteen[8] for the full season from September 1997 to May 1998.

- **Releasing predator mites in early December:** Twospotted mite checks will be carried out in late November and early December and the predator *Phytoseiulus persimilis* released into beds showing pest mite at significant levels.

- **Selecting real performers:** We will continue the ongoing search for cultivars that show a degree of pest and disease tolerance and which perform well within the Lady Norwood Rose Garden environment.

Botanic Garden Nursery

This nursery devotes a great deal of space and time into propagating, maintaining and renovating material used in the conservatory. A very wide range of indoor plant material is grown and some plants are permanent residents. As such the nursery poses quite separate and unique problems in pest control, having a greater range of pests and a wide range of semi permanent plants to house.

Some of the key nursery pests here are directly due to the nature of the operation, where stocks of plants are held for long periods and are often vegetatively propagated from year to year. Such an environment, where a wide range of plant stock is held and never completely renewed, makes pests such as cyclamen mite and black vine weevil very difficult to control.

All calendar pesticide applications have now ceased and the present policy is to apply pesticide treatments only to targeted problems and only when the need arises. The following strategies have been developed to minimise pesticide use:

Mealybug: Release of the beetle cryptolaemus to help reduce mealy bug infestations. As with the conservatory, early experience has suggested that this beetle may be a useful control tool, but is unlikely to be completely successful on its own under Wellington conditions. Several applications of Applaud (buprofezin) have also been required and mealybug populations on streptocarpus required spraying with Attack (permethrin + pirimiphos methyl).

Root mealybug and foliage mealybug are also controlled by treating pots in bleaching solution before reusing. This treatment kills off the remnants of root mealybug left within potting mix residues within the pots and also kills some foliage mealybug which have been seen to pupate under the pot rims.

Twospotted mite and whitefly: Liberation of phytoseiulus and encarsia at appropriate times and intervals.

Initially some of the very sensitive fuchsias had to be discarded because it was not possible to grow them free of whitefly damage - they were just too attractive to the pest. Last season however, both pests were successfully contained with early releases and regular augmentations of control agents.

Black vine weevil: This pest has inflicted significant losses in cyclamen and other potted plants from time to time. Recently we have trialled Otinem (a preparation of the nematode *Heterorhabditis bacteriophora*, which parasitises black weevil larvae in soil). The results are very promising although there are some limitations to the effective use of this preparation:

- It must be applied before damage is obvious, preferably in late spring, and

- It must be kept refrigerated and used relatively quickly once opened

8. This is a tentative target only and will be increased should disease or pest pressure so demand.

- It is not particularly effective when used in bark-only mixes
- It should be applied when soil (potting mix) temperatures are >12°C and <21°C
- It may not be effective if the potting mix soils dry out.

Staff have also planned to grow this year's cyclamen crop well away from the greenhouses previously used for many years. It is hoped that this strategy will reduce pest incidence because black vine weevil adults cannot fly and so they spread short distances only under natural conditions[9].

Cyclamen mite: Initially these pests are controlled by very rigorous selection of plant material when propagating known hosts which are then subjected to regular checks Any plants developing suspicious symptoms are quickly removed and destroyed. On the basis of advice from Christchurch Parks who have used it successfully, the predator mite *Amblyseius cucumeris* was trialled. Subsequent observations show that numbers of infested plants are lower than in previous years. Further releases will be made this season.

Thrips : At present thrips are controlled in similar fashion to the conservatory thrips by applying non toxic mineral oil sprays or fatty acid sprays (Safers and Defender), and roguing out badly infested plants or plant parts. We have found that mineral oil sprays can be effective - if applied diligently every ten days. However, you do have to be very conscientious with the regularity and thorough coverage. Miss a spray day, and you are rewarded with almost immediate pest resurgence! The predator mite *Amblyseius cucumeris*, is also reputed to feed on young thrips and so releases are programmed for this spring and summer. Preferred host plants, both indoors and out, will be targeted.

Aphids are a continual problem although they are relatively easy to control. Although parasitic wasps and fungal pathogens have often been found within aphid colonies, the level of control has seldom been appropriate for the plants grown and their end use. Decis has been an effective control pesticide for aphids and mineral oil sprays have also been employed. this season staff intend to try the new Low Toxicity pesticide Chess (pymetrozine).

Excluding pests and diseases: A quarantine system has been set up so that pests are not regularly imported from the conservatory back to the nursery. All returns are now carefully screened at the conservatory before return. Pest infested plants which must be kept are returned to a quarantine area in the nursery. These plants are not returned into stock houses until suitably treated and given a clean bill of health. Otherwise, seriously infested plants are discarded at the conservatory.

The new control systems in place have put greater restrictions on outside staff who in the past have informally used the nursery to propagate small quantities of plants for use within the garden. For example last season a gardener employed elsewhere effectively contaminated one of the propagation houses when they took cuttings from mite infested plants and placed them in the prop house without the knowledge of the nursery manager.

Other pests have also been spread when staff unthinkingly have moved plants from one area to another. However, all staff have now been well acquainted with the new control regime and problems such as these should not now occur.

Conclusions

For some staff who have the day to day responsibility for growing plants well, the change over to the present pest control strategies has not been hitch free or easily assimilated.

Without the dedication of a few individual staff members these control programmes could not have been implemented and run successfully. Initially there was a dearth of reliable information available and it took some time before a range of suitable technical references were obtained. Staff often had to evaluate problems and make control decisions without the support of previous experience or suitable technical guidelines. Thus, there were problems making appropriate control decisions and even more trouble attempting to justify some of them, particularly to other staff who were not convinced the new strategies could work. Many of these early problems are now ameliorated as staff have developed support network contacts with Crop and Food Research, the Christchurch Botanic Gardens and other organisations.

Pests are now carefully monitored on a formal regular basis. Regular monitoring ensures that most pests are dealt to before significant damage occurs. Such pest control strategies also help us to plan and create less favourable environments for pests and so deter rapid establishment of pest populations.

Parks staff now work smarter and accept pest monitoring and IPM strategies as an integral part of their daily activities. Every staff member must now be an important pair of eyes and early warning station, whether they are directly responsible for maintaining pest control programmes or not. Staff are now aware that they have a professional responsibility to support the IPM systems now in place and that the successful outcome of these programmes depends upon the continued support and vigilance of everyone. Every worker is now a key link in the pest control strategy. The 'leave it to spray day' philosophy is now a mark of the past.

With special thanks to: Kate Kidman, Wellington Botanic Garden Nursery, whose dedication and persistence ensured the successful establishment of IPM programmes at the nursery; Leanne Killalea and Alison Matthews , Lady Norwood Rose Garden, for their commitment to growing better roses more safely, Mike Wilton, Begonia House Conservatory, for his support and comments on this article.

---

9. Transport of infested soil, potting mixes and plant stocks are the major means of dispersal.

Plant Profile

Lavandula multifida

by Alan Jolliffe

Lavandula multifida is one of the more unusual lavenders and a relatively recent introduction to NZ gardens. It does not look like or behave like the lavenders we know and love.

The most noticeable features are the flowers and foliage. Up to three flower heads (verticillasters) appear on each long flower stem (peduncle) and the individual flowers are a clear blue with fine line markings on the petals. It produces flowers almost all year round in frost free areas or microclimates with most of its flowers appearing in late summer. It is frost tender but grows well under the eaves of the house or in similar places. Some reports indicate it can stand a -10C frost. When it has finished flowering the seed heads twist as they dry providing an interesting effect.

The light green leaves are soft and finely cut appearing to be fernlike (pinnate to bipinnate). This distinguishes it from all other lavenders. *L. canariensis* has a similar leaf shape but they are much more leathery.

When the leaves are touched, many of the fine hairs on the leaves and stems are broken. These hairs are filled with strong perfumed oils which when released are easily recognised in the garden. In comparison with other lavenders the perfume from *L.multifida* is more powerful and very distinctive. Most people will like it but others will not.

L. multifida has an unusual growth habit in that it sends up all its new shoots from a basal rootstock (similar to that of a perennial). The stems grow and flower and when finished are easily removed to encourage more stems to grow on a rotation basis. The plant will reach a height of approximately 500mm in dry sunny places. Records indicate that it can reach 1m high.

Propagation is by seed and often seedlings will come up in the surrounding soil.

L. multifida grows naturally in a number of countries in the Mediterranean area, namely Italy, Sicily, North Africa, Spain and Portugal. It grows in dry sandy soils and on rocky dry hills. *Lavandula* belongs to the Labiatae family and the genus comprises about 20 different species which are found growing from the Atlantic Islands across the Mediterranean region to Somalia to India.

The botanic name used here is *L. multifida* Linnaeus, however it has also been called *L. pubescens* Decne. (Bailey). *L. canariensis* is sometimes described as a sub species of *L. multifida*. (Bailey). *L. multifida* belongs to the section Pterostoechas (sometimes written Pterostachys) which describes the way the flowers are borne tightly compressed together in pointed winged inflorescences. Multifida refers to the leaves being "much divided".

This lavender is a great plant to have in the garden with its unusual leaf shape and its ability to flower all year round. Its perfume when touched makes it a great talking point with visitors.

References

Liberty Hyde Bailey Hortorium. (1976). Hortus Third. Macmillan. New York.

McNaughton, V. (1994). The Essential Lavender. Viking: Auckland.

McLeod, JA. (1989). Lavender Sweet Lavender. Kangaroo Press: Kenhurst.

Johnson, AT. & Smith HA. (1972). Plant Names Simplified. Hamlyn:Buckenhill.

Phillips, R. & Rix, M., (1989). Shrubs. Pan:London

Botanising by Car in S.W. Cape Province, South Africa

by Dr Barbara Hercus FRIH

Fig. 1. Gladiolus alatus

We used the opportunity on the way home from Canada to visit friends in South Africa. They had recently moved south to Cape Town and so planned to take us on leisurely day trips to explore locally. This is what we did, and as the winter rains were late there were still wild flowers to find in early October - and she like me trained as a botanist.

We drove north and out to the coast at Melkbosstrand where very white moving sand was carpeted in a profusion of daisy type flowers - the families Asteraceae and Mesembryanthemaceae - too many to try and identify. Outstanding were *Arctotis stoechadifolia* and *A. hirsuta* and *Gazania krebsiana* and behind them the shrubby yellow *Senecio elegans* and *Chrysanthemoides* spp. This was my introduction to the diversity of the flora . All I had read hadn't prepared me for it and I realised it would be impossible to identify more than a few species.

Behind the shrub belt were the restios and this was my introduction to the fynbos, that unique group of plant communities in S.W. Cape Province. Very rich in species with some 5,800 endemics it has survived because it is very poor grazing. On almost pure sand derived from quartzite and sandstone, low in nutrients, it developed in a climate of winter rainfall of 200 to 400mm, summer drought and wind and recurrent fire. The shrublands have varying proportions of tall proteoids, and heath like ericoids. The large reed- like restios are dominant on the coastal lands and amongst them are the geophytes - small perennials, annuals and bulbs, especially species of gladioli, lachenalias and orchids, that flower after the winter rain and especially after the fires. A negative effect of man-made fires is the spread of introduced alien species such as hakeas, eucalyptus, acacias and cluster pines.

We made the decision to concentrate on the easily accessible road verges, often several metres wide where we hoped to find bulbs and annuals. Armed with wild flower handbooks the two "back seat drivers" were responsible for the request stops whenever something caught our eye. The changes in plant communities were often very subtle. I wavered wildly between the 3 excitements - the completely new, a different species of a familiar genus, and those cultivated in N.Z. gardens, especially the bulbs I am trying to grow.

Some species are widespread, others occur in clumps in several locations like the orchid *Satyrium erectum* and some lachenalias. For others there was only one plant here and a related species elsewhere like the three *Ferraria* spp. and then there was the tiny orchid I nearly stepped on getting out of the car (*Disperis villosa*), the only one we saw. I have mentioned some of the plants that were dominant or were new at each stop, a few of what is a very long list.

Along the coast north to Yzerfontein where there were lots of subtle changes in the succulents, *Salicornia*, mesembryanthemums (*M.crystallina and M.alatum*) and the look alike drosanthemums and *Ruschia macowiana* and

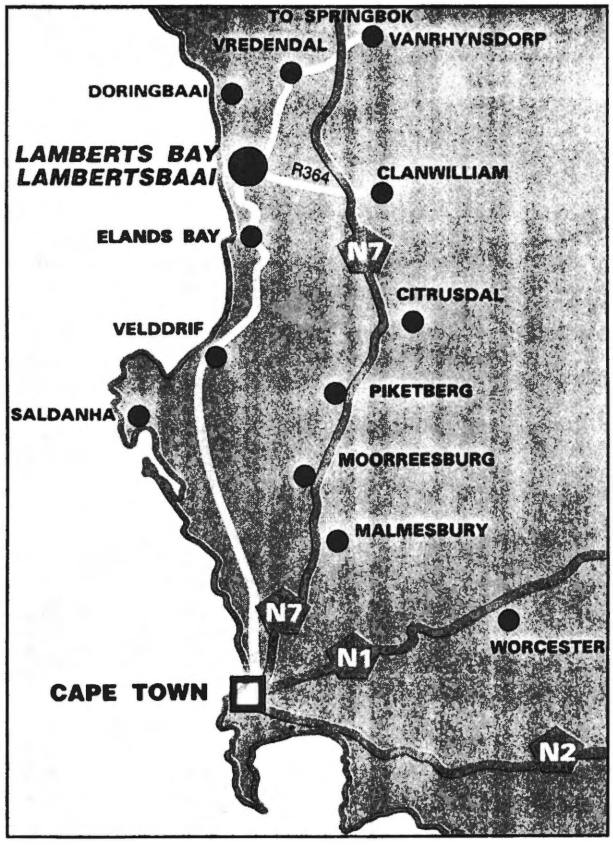


Fig. 2

R.tecta . Ostriches, and 3 kinds of gull vied for our attention. The band of restios continued and the predominant shrubs were now *Eriocephalus ericoides* familiar from home and the toxic *Zygophyllum morgsana,* It has yellow flowers with an unpleasant smell and distinctive winged seed pods. There was *Salvia africana-lutea,* with attractive goldy orange flowers used locally in cooking fish. Also several shrubby pelargoniums with pink and purple flowers, and thickets of *Lycium ferocissimum,* an unusual shrub that loses its leaves in summer. On stretches of open sand were three euphorbias- *E. mauritanica, E. tuberculata* with snake like stems and the unusual *E. caput-medusa;* twining through it all *Cysticarpus vesicarius* with inflated bladder like fruits.

At Saldanha Bay on the wind blown sands were *Grielum humifusum* looking like a yellow convolvulus and a dark orange gazania; sacred ibis and flamingoes on the lagoon and ostriches on the road. The sand here is calcareous and the delightful small annual with white/lilac flowers with a bright orange centre is called *Zaluzianskya villosa.* There were 2 tiny blue *Heliophila* spp. cotulas and a very dark pink *Limonium peregrinum.* Our host found us *Sutherlandia fructescens,* because it looks rather like our kaka beak, and *Amsinckia calycina* just because of its name. *Trachyandra muricata* has flowers like miniature turks cap lilies and *Indigofera complicata* flowers are small deep pink.

On the stretch of coast from Elands Bay to Standfontein the shrubs were dominant and the proportions of each had changed again. Amongst the *Zygophyllum* was *Eriocephalum,* now the species *E.racemosus. Pelargonium* species were prominent along with *Felicia australis, Osteospermum dentatum* and *Polygala myrtifolia.* In the open, several by now familiar species were joined by the white succulent *Disphyma crassifolium,* delicate *Gladiolus scullyi,* exotic looking *Ferraria ferrariola, Nemesia versicolor* and the tall drumstick like flowers of *Manulea altissima.*

For the sake of clarity I will describe the inland vegetation as if we were travelling north along the main highway N.7. We made detours near or from the following towns:

Malmesbury is a wheat growing area and there were sheets of *Dimorpotheca pluvialis* along the roadside and a spectacular field of *Ornithogalum thyrsoides* and *O.suaveolens* with *Albucca cooperi, Rumex lativalvis* and clumps of *Corycium orobanchoides* an orchid with crowded heads of tiny flowers with a pungent odour. Near Piketberg we found the green orchid *Satyrium odorum.*

Citrusdal has orchards of citrus and a plantation of *Aspalanthus linearis,* red tea bush -rooibos -which is harvested to make a caffeine free tea with a distinctive flavour. Here *Euryops speciosissimus* was the dominant road side shrub that I could identify, with *Pelargonium scabrum* and *Oftia africana* a curious shrub with small, toothed heart-shaped leaves closely overlapping along the branches and fragrant white flowers at the ends. At ground level romuleas, *Babiana tubulosa* (cream with red markings) and lots of *Freezia* seed pods were amongst *Erodium* spp, *Lobelia coronopifolia,* oxalis and the white cats tail *Bulbinella caudata.*

Near Clanwilliam on deep sand was the spectacular *Gladiolus alatus* - I wish I could grow it -ornithogalums and *Convolulus capensis.* Two species of Asphodel - *Tracyandra falcata,* rather like a fine asparagus shoot with white flowers in a ring at the end is quite different from *T.muricata* which has branched flower stems and flowers like tiny turks cap lilies. The shrubs included 3 species of *Aspalanthus, A.hispida, A. ternata* and *A quinquifolia* with yellow pea type flowers and *Berkheya rigida* with very spiny bracts to small yellow daisies. There were also a *Diosma* and *Phylica stipularis.*

Our hosts told us that Clanwilliam Botanical Garden had looked quite different two weeks earlier. It was a mosaic of colour with species of *Ixia, Felicia, Wahlenbergia, Arctotis* and *Mesembryanthemum* and their relations. babianas, *Sparaxia*, white *Nemesia* and a sward of bright yellow freezias with small clumps of many other species.

Near Leipoldtville in flower were *Arctotis hirsutus, Lachenalia elegans* with scrub of *Euryops, Osteospermum* and *Lasiosiphon brachyglottis.*

Further north near Vredendal where the soils are red was *Pelargonium fulgidum, Silene undulata, Dideltia carnosa* like an elegant yellow gazania and the species from the north *D. spinosa,* with lots of blue *Heliophilas. Galenia crystalina* was a shrub not seen before.

Near Vanrhynsdorp the scenery changed and the arid flats were a haze of purple and yellow daisies with grey bushes of salt bush, *Blackiella inflata* and *Limonium sinuatum* and small termite mounds. Some of the deep yellow flowers were *Helichrysum moeserianum* and *Othonna coronopifolia.* In

the Post Office there was a jar full of the brilliant orange *Ornithogalum dubium* but we couldn't find it in the fields.

A number of hairpin bends took us up the escarpment, about 900m. onto flats that stretched far north and east. This was the end of the fynbos, only a few shrubs remained, and large areas were grazed. We found two tiny felicias, more lachenalias, *L.unicolor* and *L.elegans, Cotula* (*C. coronopifolia* ?), a small very dark orange *Gazania* and *Ferraria divaricata.* Many of the species have their affinities with the Namaqualand flora to the north.

A stop near Nieuwoudtville at Macgregor's farm there were sheets of colour, blue *Moraea tripetala* and pink yellow and white homerias - the Cape tulip - *Homeria flaccida, H. miniata,* and *H. minor,* and blue *Echium vulgare* known in Australia as Patterson's curse. Along the road side was this botanists dream. Four species of *Lachenalia,* the two seen earlier and *L.mutabilis,* and *L.namaquensis, Moraea spathulata, M. tripetala* and *M. aristata, Gladiolus scullyi* and a very dark blue *Babiana, Cotula laxa, Nemesia ligultata Ornithogalum concinum,* the red *Gazania krebsiana,* a small yellow daisy, a lemon mesembryanthemum and many more. Restricted to a patch of gravel was a large stand of the orchid *Satyrium erectum* with *Babiana leipoldtii.* and beside a small bridge brillliant red gladiolus which we think was *G.cunonis.*

Back in Cape Town we spent time in Kirstenbosch Botanic Garden with its sweeping beds of Restio genera, ixias and some of the over 100 species of *Pelargonium.* There is the Erica garden and an indigenous herb garden amongst many other features both for visual attraction and educational value. It was the wrong time to see the many Proteas in flower but two humming birds were enjoying the flowers on the small protea 'Thomson's gift'.

I have notes of species to check, scribbled drawings of flowers and seedpods I hope to identify, like the seed pods that look rather like miniature kowhai pods which belong to a small cream herb, an Oxalis with needle like leaves at the nodes up the stem - enough to keep me researching and eager to go back earlier in the season - perhaps in September.

References

Manning, John and Goldblatt, Peter 1996 West Coast. South African Wild Flower Guide 7.

le Roux, Anneliese and Schelpe, Ted. 1988 Namaqualand. South African Wild Flower Guide 1

Jeppe B. 1989, Spring and Winter Flowering Bulbs of the Cape. Oxford University Press.

Notable Trees New Zealand

The Three Anniversaries

The Royal New Zealand Institute of Horticulture Inc. is 75.
The RNZIH Notable Trees Scheme is 21.
The NZ Arboricultural Association Inc. is 10.

Over the last 75 years the RNZIH has been a major force in the development of horticultural practice in this country and has even surmounted a world war. It has launched many educational projects which have helped New Zealanders develop their horticultural skills and has advanced commercial training to a high level. One of these educational projects was the establishment of a committee to register and publicise the need for tree protection in NZ. This was called the RNZIH Notable Trees Scheme.

In 1976-77 the Chairman of the National Executive, Professor T.M. Morrison gave the Annual Report. In this report Mrs. W. Shepherd, as convenor of Regional Horticulture, stated that Mr. P.J. Skellerup of Christchurch had given $1,000 to support the Tree Registration Scheme. A subcommittee of 4, under Regional Horticulture, was set up, with Mr. C. Howden as Chairman and the Scheme was adopted at the Executive Meeting on 10 August 1977. The very first Notable Tree Registration was on 17 January 1978. There are now records of over 2000 trees and of their importance whether for size, beauty or for scientific reasons. They also provide a rich social commentary of New Zealand's development through communities who have celebrated major events by a dedication of tree plantings. To date there are some 360 registrations and the number is growing at a rapid pace due to the enthusiastic support of the NZ Arboricultural Association Inc. NZAA. This association has this year celebrated it's 10th anniversary and become the 31st. Chapter of the American Society of Arboriculturists.

It is to the great cedit of the RNZIH that it foresaw the potential and the importance of supporting the infant Association 10 years ago. Administrative support was offered at that time by the RNZIH Chairman Alan Joliffe and Executive. The rapid growth of the NZAA has benefited the RNZIH Notable Trees Scheme in that there are now skilled arboriculturists throughout the country able to advise, treat and register Notable Trees. The attendant publicity to trees as a result of both organisations efforts has raised public awareness as never before. The new image which the RNZIH Executive has approved will do much to enhance and streamline the electronic accessibility of the organisation of NOTABLE TREES NEW ZEALAND - NTNZ.

As part of the NTNZ publicity programme there will be a Regional Focus for each issue.

This contribution to the RNZIH Journal will focus on the Waikato as part of the NZAA 10th. Anniversary Conference to be held in Waikato University Hamilton from 20th to 23rd. November 1997. This promises to be a very major conference judging by the organisation already in place. NTNZ will be on display courtesy of the NZAA.

Focus - Waikato Region

The Waikato Region comprises 10 districts from north to south. Franklin - Hauraki - Waikato - Hamilton - Matamata - Waipa - South Waikato - Otorohanga - Waitomo - Taupo. This is a very large area and well populated by New Zealand standards. It has rich soils and a wide variety of farming activities. Trees make a significant contribution to the beauty of the landscape as seen when driving through the region. It is remarkable that such a quality landscape has registered so few of it's magnificent Notable Trees. One new registration is an example and follows.

'The Rest and be Thankful' Macrocarpa
5 Macrocarpa planted @ 1891.
Maungakawa Reserve on the road to Sanatorium Hill - Cambridge to Te Awamutu Cambridge
Registration No. 351. by Simon Cook Msc.(Bot.),Dip.Tchng.

Simon Cook has provided a splendid documentation of these statuesque and historic Macrocarpa Trees. His documentation includes early photos 1906 to 1996, library researches on tree statistics and an aerial photograph.

The group of trees that I would like to see added to the RNZIH Notable Tree Register are spectacular in size health and historical significance. The 5 *Cupressus macrocarpa* were planted during the early development of the Homestead of Sophie Thornton and her 10 children, in or around 1891.

The house had a short history (see article by Eris Parker Papakura Historical Society), all contents being auctioned off in 1922, after use as a TB Sanatorium for 20 years. Sections of the house can still be found in the Waikato Region.

It is interesting that the corner named 'Rest and Be Thankful' (by Sophie) was planted with trees having the same name, 'Monteray' (e in Monterey cypress), as the house in which Sophia's husband (Daniel Bateman Thornton) died in England.....". Cook 1996.

"It may be possible to determine the provenance of the trees

through further research into the gardener at that time, Thomas Brown. The Bethlehem Macrocarpa (ref. Burstall and Sale 1984, pp 2/93/95) was planted in 1892, so seed stock may be related. The trees are situated on the extended roadside reserve (see attached map and aerial photos), and therefore the property of the Waipa District Council". Cook 1996

The tree heights (4 are over 30 m.) are from 23.5m to 36m. with widths from average north to south 26m. to east to west average 22.6m. The average circumference 9m. (2 of the largest 11.40m - smallest 5.80m).

Cook concludes "the trees are significant in their age, stature and historical importance. They may also become an important genetic pool, noting the obvious variation within the 5 specimens. #1/ or 2/ have produced a number of seedlings which are tall and slender, showing possible utilisation by FRI. for breeding (as is the Bethlehem macrocarpa).

Although I believe it is important to leave trees to grow as much in their natural form as possible, it may be a justifiable precaution to do some tree surgery/ deadwood/ target pruning on them in the near future. This being to enable the public to rest and relax, in comfort and safety, on their trek to the summit of Maungakawa". Cook 1996.

WANTED : Dead or Alive.

Gratitude offered for up to date information on the following :

Recorded by SW. Burstall in NZ Forest Service Forest research Institute Forestry Mensuration Report no.17 - 1972 unpublished.

Elaeocarpus dentatus - Hinau. In a paddock opposite the High School Ngaruawahia Height 22m. diameter at 1.80m. = 1.50m. in 1970.

Metrosideros excelsa - Pohutukawa. 'Tangi te Korowhiti ' Kawhia. Height 17m. width one sided 15.24m. in 1969.

Podocarpus dacrydioides - Kahikatea. 'Huiputea' near the Railway Station Otorohanga. Height 25m. width 16.7m. in 1969.

Quercus robur - English Oak. 'The Bishops Oak' Ashwell Mission site near Taupiri. Height 14.60m. width 24.40m. in 1969.

Taxus baccata - English Yew. Selwyn Park Te Awamutu. Height 10.36m. width 11.80m. girth at .030m = 4.26m. in 1969.

Abies noromanniana - Caucasian Fir. Broadmeadows Bruntwood. Height 36m. width approx 12m. in 1970.

Acer palmatum - Japanese Maple. 23 Hall Street Cambridge. Height 11.50m. 16.76m. in 1970.

Acer saccharum - Sugar Maple. Victoria Street Cambridge. Height 22m. diameter at 0.6m = 1.24m in 1970.

Albizzia julibrissen - Silk Tree. Lake Domain Drive Hamilton. Height 9.10m. 17.40m width in 1970.

Araucaria bidwillii - Bunya Bunya. Hamilton Road Cambridge. 20.70m. 18,20m. in 1969.

Buxus sempervirens 'Suffruticosa' - Edging Box. Woodstock Somerville Road Tirau. Height 5.18m. width 7.30m. in 1970.

Camellia japonica 'Pillida'. Selwyn Park Te Awamutu. Height 7m. width 7.60m. in 1970.

Carya tomentosa - Mocher Nut. Ruakura Agricultural Research Centre Hamilton. Height 17.80.m. width 15.24m. in 1970.

Cephalotaxus harringtonia var. drupacea - Cows Tail Pine. Ruakura Agricultural Centre Hamilton. Height 6,70m. width 11.30m. in 1969.

Chamaecyparis obtusa - Hinoki Cypress. Trelawney Stud Pukekawa Waikato. Height 20m. diameter at 1.40m. = 0.64m. in 1970.

Chamaecyparis pisifera 'Squarrosa'. Marshmeadows Newstead. Height 26m. diameter at 1.40m. = 0.64m. in 1971.

Cupressocyparis leylandii. Ruakura Soil Research Substation Ohaupo Road Hamilton. Height 12.20m. diameter at 1.40m. = 0.40m. in 1969.

Cupressus guadalupensis - Guadelupe cypress. Duxfield Road Horotiu. Height 14.6m. width 12m. in 1971.

Cupressus macrocarpa - Monterey Cypress. Scotchman's Valley Tauwhare. Height 36m. diameter at 1.40m = 1.72m. in 1970.

Eucalyptus botryoides. Ruakura Agricultural Research Centre Hamilton. Height 40m. circumference at ground level 9m. in 1969.

Eucalyptus fastigiata. Woodlands Estate Gordonton. Height 31m. width 27.40m. in 1969.

Eucalyptus leucoxylon 'Rosea campbellii'. Entrance Gate RNZAF. Base Te Rapa. Height 22m. diameter at 0.9m. = 0.80m. in 1972.

Eucalyptus macarthurii. Primary School Grounds Ngaruawhahia. Height 28m. width 26m. in 1971.

Eucalyptus obliqua. Kihikihi Road Te Awamutu. Height 32m. width 33.50m. in 1972.

Eucalyptus regnans. Marshmeadows Newstead. Height 69m. circumference at 1.4m. = 11.30m.

Eucalyptus saligna. Pukeroro 3miles north of Cambridge. Height 47.50m. diameter at 1.40m. = 2.13m.

Fagus sylvatica - Common Beech. 4 London Street Hamilton. Height 25.60m. width 26.50m. in 1970.

Fraxinus americana - White Ash. Woodlands Estate Gordonton. Height 21.30m. width 24.40m. in 1970.

Fraxinus pennsylvanica - Red Ash. Duxfield Road Horotiu. Height 20m. width 24.30m. in 1971.

Gleditsia triacanthos 'Inermis' - Honey Locust. Duxfield Road Horotiu. Height 15.24m. width 17m. in 1971.

Grevillea robusta - Silky Oak. 10 Boundary Road Hamilton. Height 24m. diameter at 1.40m. = 0.96m. in 1972.

Idesia polycarpa. Melody Lane Ruakura Agricultural Research Centre Hamilton. Height 8.80m. width 18.30m. in 1970.

Ilex aquifolium - Common Holly. Selwyn Park Te Awamutu. Height 11.60m. width 14.63m. in 1970.

Juglans cordiformis var. ailantifolia - Japanese Walnut. Gudex Memorial Park Maungakawa. Height 10.60m. width 23m. in 1970.

Juniperus chinensis - Japanese Juniper. Woodlands Estate Gordonton. Height 13m. width 13.70m. in 1970.

Ligustrum lucidum - Glossy Privet. Selwyn Park Te Awamutu. Height 14.60m.width 21.36m. in 1970.

Liquidamber stryraciflua - Sweet Gum. Victoria Street Cambridge. Height 27m. diameter at 1.40m. = 1.12m. in 1970.

Lithocarpus edulis - Japanese Evergreen Oak. Te Koutu Park nr. tennis courts Cambridge. Height 9.75. width 9.10m. in 1970.

Maclura pomifera - Osage Orange Tree. Pirongia Road Mangapiko. Height 22.55m.Diameter at 1,40m. = 0.63m. in 1970.

Magnolia grandiflora. Thorncombe Cambridge Road Te Awamutu. Height 14.63m. width 16.76m. in 1972.

Magnolia kobus. Hamilton Road Cambridge. Height 7.30m. width 11.60m. in 1970.

Magnolia x soulangeana - Tree Tulip. Kihikihi Road Te Awamutu. Height 10.60m. width 13.70m. in 1972.

Melia azedarach - Bead Tree. Drumlea Livingstone Road Tuhikaramea. Height 16.80m. width 25.60m. in 1970.

Picea smithiana - Himalayan Spruce. Hamilton Road Cambridge. Height 23m.
diameter at 1.40m. = 0.93m. in 1969.

Pinus halepensis - Aleppo Pine. Saulbrey Road Cambridge. 27m. diameter at breast height 0.68m. in 1971.

Pinus roxburghii - Chir Pine. Crawford Road Horotiu. Height 31m. diameter at 1.40m. = 0.99m. in 1971.

Quercus borealis - Red Oak. Pirongia Road Mangapiko. Height 17m. width 29m. in 1970.

Quercus ilex - Holm Oak. Cambridge/ Te Awamutu/Cox Roads corner. Height 18.30m. width 18.30m. in 1972.

Quercus palustris - Pin Oak. 1322 Victoria Street Hamilton. Height 21.40m. width 26m. in 1970.

Quercus species thought to be Quercus muehlenbergii - Chinkapin Oak. 1305 Victoria St. Hamilton. Height 16m. width 19.80m. in 1970.

Robinia pseudoacacia -Black Locust. Fernando Farm Pickering Road Tamahere.Height 21m. diameter at 1.40m. = 1.19m. in 1970.

Styrax japonica - Japanese Snowdrop Tree. Drumlea Livingstone Road Tuhikaramea.Height 7.30m. width 10.60m. in 1970.

Thujopsis dolobrata - Arbor Vitae. Whareora Leamington. Height 13m. width 10m. in 1970.

Thujopsis dolobrata 'Variegata'. Sing Road Paterangi. Height 10.40m. width 13.70m. in 1969.

Tilia x europea - Common Lime. Newstead. Height 21.40m. width 18.30m. in 1969.

Any information you may have or find by a visit to the trees listed would be gratefully appreciated if sent to :

Ron Flook Dip. ILA (Glos.), ALI (UK), PPNZILA, AHRIH.
National Registrar, 539 Rocks Road Tahunanui Nelson.Tel/Fax 64-3-548-6539. e-mail <flook@netaccess.co.nz>

Book News and Reviews

Supported by Touchwood Books, specialist horticultural booksellers of Hawkes Bay

THE GARDENER'S GUIDE TO GROWING IRISES

by Geoff Stebbings,
David & Charles, 1997
Price $39.95

Focusing on the iris, this guide allocates each species to its recommended growing area, such as the water garden, the shady garden, the summer border, and the rock garden. All plants are cross-referenced to classification chapters which explain how the genus is made up.

THE GARDENER'S GUIDE TO GROWING PEONIES

by Martin Page
David & Charles 1997
Price $49.95

Covering over 10,000 varieties of herbaceous peony, this book examines the various species and offers advice on the control of pests and diseases and cultivation. Botanical illustrations help to identify the different species.

CYCLAMEN

by Christopher Grey-Wilson,
Batsford, 1997
Price $79.95

Cyclamen offer great variety of form and colour and are ideal for the specialist gardener. This work looks at the species in its historical contexts and charts the development of the important florist's cyclamen, as well as providing detailed notes on cultivation and propagation.

IRISES FOR NEW ZEALAND GARDENS

by Karen Glasgow
Godwit Press 1996
Reviewed by Peter Berry

Not since Jean Stevens book "The Iris and its Culture" written in the 1940's has an iris book with a local flavour been published. In a country with so many skillful and talented gardeners the time gap of 50 years is too great. Jean Stevens' book is still widely used and consulted if you are lucky enough to have a copy but it is dated in style and photographs and an update was well over due.

Many people have over a life time of study and observation developed a knowledge that is of immense value to others but few have the dedication or talent to convert it into a readable and valuable publication. Karen Glasgow has in my opinion achieved that. Sadly she died prior to its publication and her work was brought to fruition by her many friends in the New Zealand Iris Society. I did not have the pleasure of meeting her but knew of her from reading back copies of the Iris Society Bulletin when I first became absorbed by tall bearded irises about ten years ago.

The book is truly a home gardeners' companion. Written in simple but effective language it gives the amateur gardener an excellent insight in to the iris family. The first chapter Iris - the year round flower, dispels the myth that iris are a short season flower. By planting a range of the species, flowers are possible throughout the year. During 1961 I had tall bearded iris in a vase in the house every month of the year. This is a little unusual but not impossible.

Chapter 2 gives a very brief but essential explanation of the genus covering the rootstock, flower and foliage. The opening sentence really invites readers to broaden their knowledge about iris. It says "Irises are a diverse genus of around three hundred species, but extensive hybridisation has given rise to many more garden forms"

The next chapter, Irises in the garden starts with the succinct sentence "Irises are beautiful and versatile garden plants. There is a wealth of knowledge in a few pages that would allow any gardener to select what they wanted to grow and then to achieve it. The variations in the plants requirement with regard to soil type, light and shade, water, and fertility are all adequately explained in straight forward language.

The following two chapters explains the difference between rhizomatous iris and bulbous iris and the divisions within each group. They will probably be the most referred to chapters in the book and the mastery of the knowledge they contain will lead to excellent displays of iris around New Zealand.

The final two chapters on "Pests and Diseases" and "Propagation" round off an excellent home gardeners guide to iris growing.

The book is generously enhanced with photographs through out which support the text and will I am sure create many enquiries from plant shops. All in all a valuable edition to the library of garden books that is written for our conditions and

talks in our time zones. It will I am sure be widely read and referred to for many years.

NEW ZEALAND COAST AND MOUNTAIN PLANTS - THEIR COMMUNITIES AND LIFESTYLES.

by John Dawson and Rob Lucas.
Published by Victoria University Press 1996
Price $59.95

Reviewed by Dr Ross E. Beever, Manaaki Whenua Landcare Research

Recent years have witnessed an explosion in nature photography in New Zealand and Rob Lucas is amongst the most skilled of those focusing on native plants. There are many of his superb images in this book, my favourite being that of two vegetable sheep, *Raoulia eximia* and *Haastia pulvinaris*, growing together in Nelson Lakes National Park. However, this book is more than just a collection of photographs, as these are accompanied by a text written by retired Victoria University botanist John Dawson. It concentrates on plants of open spaces, especially the substantial areas of coastline, inland wetlands, and the uplands where forests are absent. As such it complements an earlier book on forest plants by the same team. Like its predecessor, this book will appeal to the layperson as it avoids technical terms and statistics but nevertheless remains authoritative. However, it will frustrate those wishing to delve further into the topics discussed, as the reference list is rather general and the index minimal.

Two main themes weave through the book. First the diversity of geology and landform in New Zealand, and how this provides habitats for plant communities to develop, and second the ways in which plants have adapted to the environmental stresses imposed by life in situations which generally do not support tree growth. Indeed, to those more familiar with our forest flora, it is salutary to realise that there are more species of plants in the alpine vegetation than in the forests.

Following a brief historical introduction, the story begins at the coast with an account of the seaweed forests of the sublittoral and the lichens of exposed rocky shores. It moves to a discussion of the problems posed by salt water to most land plants, and the communities of rocky coasts, beaches and sands dunes, and saline wetlands. Human interference has grossly modified coastal New Zealand, and the authors address the question as to whether offshore islands such as the Three Kings preserve examples of 'original vegetation'; they conclude that they are a mixed bag. As a diversion, they describe some of the spectacular endemics found on the northern islands. They then move to the gaps in the forest (and nowadays pasture), i.e. the open places between coast and mountain, from various wetlands and riverbeds to short tussock grasslands and serpentine vegetation, concluding with an account of the Chatham Islands. Progressing upwards, they describe the transition between forest and shrubland in the mountains, before emerging onto the tussock herbfields. Here some emphasis is placed on the tussock grasses themselves and the spaniards or speargrasses, before moving to a discussion of some of the many white-flowered alpine plants. The next chapters deal in turn with fellfield with its distinctive vegetable sheep, cushion moorland of the flat-topped Otago mountains, plants of snow banks and cushion bogs, and finally those remarkable plants of shingle scree slopes. Scree species pose a number of intriguing evolutionary questions; one posed by the authors is why they are so well camouflaged as to be difficult to see among the stones. From high altitude, the text moves to high latitude with a discussion of the subantarctic islands, including their spectacular megaherbs, and a discussion of the human impact on the subantarctic. To complete the text a brief account of the evolutionary origins of the alpine flora is provided, along with a list of useful references, a glossary of common names, and an index.

In a book covering such diversity in a relatively small compass, it is natural that each reader will find something to quibble about in the emphasis given different aspects. I would like to have seen a stronger indication of the dynamics of vegetation change. The title page features a sundew growing on a log felled by a Taupo eruption 1800 years ago, but there is no further description of the role of lava flows and ash showers in moulding plant communities. Also, I would question the ability of text and photograph to adequately convey the essential features of plant communities, and would have liked to see some use of diagrams. The non-vascular plants - important components of many of the communities described - feature only in passing, except for the section on the marine environment, where seaweeds are indeed impossible to ignore. Some photogenic lichens are illustrated (e.g. Figs 7 and 134) but not named, and those in Fig. 7 are incorrectly described as 'crustose' rather than 'foliose' (though admittedly appressed). However, my major criticism is of the appendices. The 'Glossary of common names' lists only some of the names used in the text. It would have been helpful to many readers to have all names used listed, along with their scientific equivalent and their plant families. Parataniwha is mentioned (p. 74), but there is no indication as to its scientific name. We are told (p. 47) that sea grass (Zostera) is not a grass nor a seaweed but a flowering plant. Well yes, but so are grasses. A more comprehensive index, perhaps combined with a glossary, would have gone some way to helping those readers wishing to delve deeper.

The production of the book is of a very high standard, the colour printing excellent, and the layout pleasing, although it sometimes takes a little time to match caption to photo. Amongst the few errors is the misspelling of naturalist E.G. Turbott's surname (p. 55). The choice of common names is generally excellent, although one I would quibble with is the use of golden tainui for kumarahou (*Pomaderris kumeraho*).

I suggest that this book, along with its companion volume, will appeal to those beginning botanists wishing to move past providing a name for a plant and wanting to learn something of its ecology. Together they provide an overview of New Zealand plants suitable for horticulturists interested in cultivating the New Zealand flora, and for the visitor from overseas seeking an insight into its many novelties. While primarily concerned with providing an account of the plants and their communities, it addresses the various ongoing human impacts upon these systems, thus providing reasons as to why such systems have to be actively conserved.

(This book was winner of the Natural Heritage Section of the 1997 Montana New Zealand Book Awards).