# Horticulture

**in New Zealand**

Bulletin of the Royal New Zealand Institute of Horticulture (Inc.)


**44**

**Winter 1987**

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# HORTICULTURE
## IN NEW ZEALAND

BULLETIN OF THE ROYAL N.Z. INSTITUTE OF HORTICULTURE
NUMBER 44, WINTER 1987



Cover Photo: *Cupressus macrocarpa*

**ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC)**

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Views expressed are not necessarily those of RNZIH.

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# EDITORIAL

My apologies for the lateness of this issue of the Bulletin. I ended up spending most of July in hospital so wasn't able to get the Bulletin organized. The good part about my stay in Christchurch Women's Hospital is that I now have two little sons. They are very well and keeping me busy.

We have been having some exceptionally mild weather in Christchurch. Many trees and shrubs are flowering several weeks earlier than usual. The *Magnolia campbellii* in the Christchurch Botanic Gardens, which doesn't usually flower till mid-August, has been in flower since early July.

The only disadvantage with this mild weather is that I feel I should be out weeding and tidying. When it is raining and blowing it's easy to feel justified in staying inside with a good book.

I hope you will find something of interest in this Bulletin. You will read in the Executive Officer's report that some changes are being made to the Institute's publications. The Bulletin will be typeset from now on. There will only be three issues per year and everyone will receive a copy of the Annual Journal. With the Bulletin being typeset we will be able to get as much information in three issues as we now get into four issues. So don't let this be an excuse for not writing an article or sending in any contributions such as photos or drawings.

There is some information resulting from the very successful conference in Hamilton. I'm sure everyone enjoyed the conference and plans are going ahead for the 1988 conference at Lincoln College.

By the time you receive this issue of the Bulletin the elections will be over and we may have some idea what direction the country will be going in for the next term of office. Hopefully horticultural education won't be too hard hit by Government policies.

Spring is nearly here with all its lovely flowers to enjoy. No doubt all Institute members will be watching out for the signs of spring while enjoying the winter flowering plants such as Witch Hazel and Winter Sweet.

Enjoy this issue of the Bulletin.

Regards,

Pamela Gibbons
EDITOR.

# NOTABLE AND HISTORIC TREES
# NAME CHANGE

Conference at Hamilton confirmed that the R.N.Z.I.H. Trees scheme, in future, would be referred to as the Notable Trees Scheme. Phasing in this name change will be gradual as stationary and tree labels, must be used up first. From now on the word 'Historic' and 'Notable' appearing on labels will be interchangeable until existing stocks of 'Historic' are exhausted. The committee for Notable Trees are confident this simplification will be easier for all who are engaged in identifying, registering, and labelling New Zealand's nationally important trees. The R.N.Z.I.H. will continue to press Government for statutatory recognition of registered trees and an improvement to existing but unsatisfactory protective legislation.

You can help. Ensure the the R.N.Z.I.H. have registered the nationally important trees in your area. Where they are not labelled contact your local Tree Registration Officer to find out why and secure their registration. Our list of T.R.Os. currently operating are:-

BAY OF ISLANDS/HOKIANGA

Mrs Mary Cullinane
Titore Way
RUSSELL.

WHANGAREI

Mrs E.E. Reynolds AHRIH
42a Anzac Road
WHANGAREI.

AUCKLAND

Mr E. Chigenell
'The Ark'
R.D. 3,
ALBANY.

Mr Arno King
143 Kowhai Road
Mairangi Bay
AUCKLAND 10.

Mr G.R. Donaldson
Attwood Road
Paremoremo
R.D. 3, ALBANY.

HASTINGS

Mr Thomas Looij
Parks & Recreation Dept.
Hastings City Council
Private Bag
HASTINGS.

BAY OF PLENTY

Mr R.W. Hart
c/- Ministry of Works
P.O. Box 646
TAURANGA.

WANGANUI

Mrs Una Hawken
12 Tasman View
WANGANUI.

LEVIN

Mr Ned Nicely
Superintendent of Parks
Levin Borough Council
Private Bag
LEVIN.

Mr Craig Kidd
Parks Foreman
Levin Borough Council
Private Bag
LEVIN.

KAPITI

Mr M. Cardiff
Reserves Superintendent
Kapiti Borough Council
Private Bag
PARAPARAUMU.

GISBORNE

Mr John Johnston
N.Z. Forest Service
P.O. Box 944
GISBORNE.

NORTH TARANAKI

Mr G. Fuller
Curator
Pukekura Park
25 Victoria Road
NEW PLYMOUTH.

NELSON

Mr Peter Grundy
17 Konini Street
NELSON.

GREYMOUTH

Mr B.E. Ferriman
Reserves Superintendent
Greymouth Borough Council
P.O. Box 56
GREYMOUTH.

OTAGO

Mr S. Kemp
8 Killarney Street
ALEXANDRA.

Mr N. Struthers
80 Bush Road
MOSGIEL

Mr Frank Buddingh
P.O. Box 8032
DUNEDIN.

STEWART ISLAND

Mr R. Tindal
N.Z. Forest Service
P.O. Box 3
HALFMOON BAY.

SOUTHLAND

Mr L.J. Metcalf
Director Parks & Reserves
City Corporation
INVERCARGILL.

WAIROA

Mr J. Dean
c/- Wairoa District Council
P.O. Box 54
WAIROA.

NAPIER

Mr S.J. Wheeler
c/- Post Office
Haumoana
HAWKES BAY.

MARLBOROUGH

Mr B. Soper
16 Colemans Road
BLENHEIM.

Mr R. Ballinger
85 Budge Street
BLENHEIM.

CANTERBURY

Mr W. Feilding-Cottrell
Springs Road
R.D. 3
CHRISTCHURCH.

Mr N. Belton
South Island Tree Services
P.O. Box 3151
CHRISTCHURCH.

Mr H. Ericson
AKAROA.

Mrs M. Bulfin
P.O. Box 4
LINCOLN

Mr Richard Budd
14 Butts Valley Road
CHRISTCHURCH.

WAIRARAPA

Mr J.G. Rotman
Cobden Road
R.D. 1
CARTERTON.

# SEARCH FOR SWEET CHESTNUT TREES

The New Zealand Chestnut Growers Association are searching throughout New Zealand for different sweet chestnut species. These are the *Castanea* species. Four species *C. sativa, C. dentata, C. crenata* and *C. moblisima* were all imported into New Zealand by the late 1880s.

*C. dentata* was virtually wiped out in the United States during the first quarter of this century so many people would be most excited to find trees of this species in New Zealand.

Some information and illustrations are provided on the following pages to help you identify the different species.

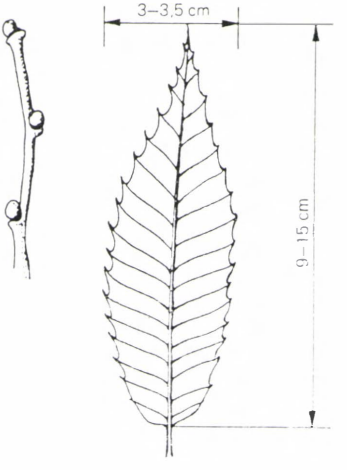
The association is also interested in any unusual forms of sweet chestnut, perhaps a tree that crops in bunches or a tree that could be used to develop a dwarfing rootstock.

If you know of any *Castanea* tree of interest please write to:-

Ernest New
Executive Director
N.Z. Chestnut Growers Assn. Inc.
P.O. Box 1328
INVERCARGILL.

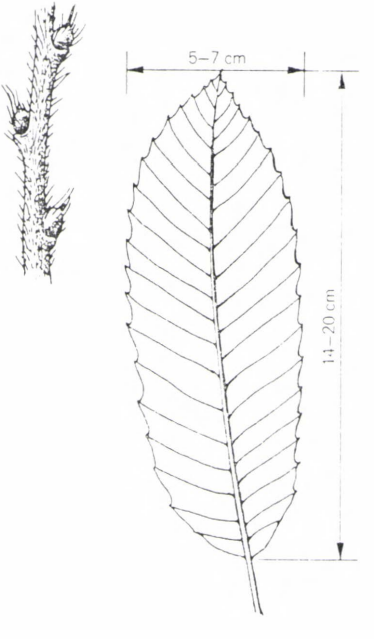

**Genus Castanea**

1 *C. dentata*, USA
2 *C. davidii*, China
3 *C. ashei*, USA
4 *C. crenata*, Japan
5 *C. henryi*, China
6 *C. alnifolia*, USA
7 *C. mollissima*, China
8 *C. seguinii*, China
9 *C. floridiana*, USA
10 *C. pumila*, USA
11 *C. ozarkensis*, USA
12 *C. paucispina*, USA
13 *C. sativa*, Europe



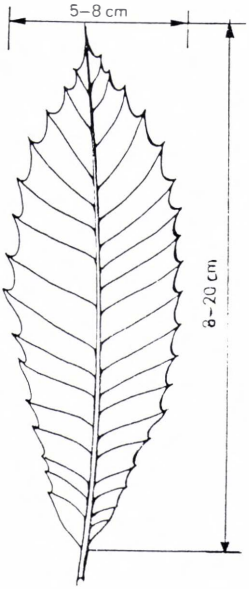

Castanea crenata S and Z - Japanese Chestnut

Height up to 15 metres, leaves obloid lance like, pointed long wise, the edge is toothed, hairs of a star form, glands are reddish. The twigs are initially hairy, later they are smooth. Rounded buds. Cromosomes 2n = 24. Starts to fruit at the age of 2 years.



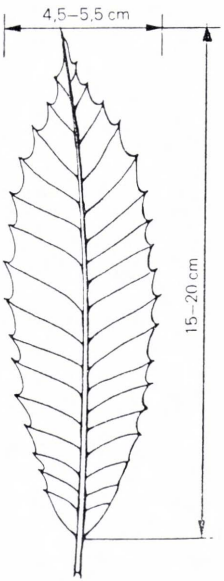

Castanea mollissima - Chinese Chestnut

Height up to 20 metres. Elliptical leaves with the apex sharply pointed. Edge saw toothed slightly twisted. Hairs felty and soft on the underside -there are no glands. The twigs are short haired, young shoots and buds are often very hairy with long hairs. Buds are rounded with points. Cromosomes 2n = 24. Starts to fruit at the age of 15 to 20 years.




Castanea sativa Mill - European chestnut

Trees of 25 to 30 metres high of expansive form. Obloid leaves, roughly toothed, lance like, down on the underside of the leaves with smooth rigid hairs, glands of the form of small staff or club like. Twigs are hairy and later smooth, red brown. The ratio of the length - width of buds is 2 : 1. Pointed buds. Cromosomes 2n = 24. Starts to fruit towards an age of 15 - 20 years.




Castanea dentata

Height up to 35 metres, less expansive than that of Castanea sativa. Typically it is a forestry tree. Leaves are obloid lance like with roughly toothed edges and from the time they are young they are smooth. The twigs and the buds are also smooth. Cromosomes 2n = 24. Starts to fruit at the age of approximately 15 - 20 years.

# SAYING IT WITH FLOWERS

*From The Economist, January 10 1987*

With the development of temperature-controlled transport, roses from Israel, carnations from Kenya and orchids from Thailand are gracing homes throughout the northern hemisphere's winter. The Dutch, who have long dominated international trade in flowers, are fighting back with capital-intensive production.

The most recently published figures from the Flower Council of Holland put the value of world trade in cut flowers and house plants at $2.5 billion in 1985. And the trade is growing at about 10% a year. Holland's producers still account for the lion's share: 63% of all exports of flowers and 51% of house plants. In 1985, some 23,000 Dutch producers grew 6.1 trillion cut-flowers and 440m house plants under 22,150 acres of glass and on 10,560 acres of open land.

Some of Holland's trade came from re-exporting plants imported from other countries. European producers increasingly import cuttings or half-grown plants from as far afield as Costa Rica or Sri Lanka from which to grow finished plants ready for sale.

Floriculture has become an increasingly attractive alternative to agriculture in many tropical countries. It uses little land and lots of labour. The capital investment required is small: a simple shading structure, stock, irrigation and a packing shed. The climate of tropical countries allows them to grow crops that require constant high temperatures - for example *Anthurium,* known as the flamingo flower. And they can supply flowers when demand is strongest in the north - winter and early spring.

Even though some 60% of its cost arises after the flowers leave the packing shed (for airfreight, insurance, transport and selling commissions), Colombia, with 13% of the market, has the second-biggest share after Holland of world trade in cut flowers. Warm countries around the Mediterranean, like Spain and Israel, are also developing their floriculture industry. The Dutch see Spain as a particularly strong competitor now that it is in the E.E.C.

In northern European countries like Belgium,Denmark, and Holland, the disadvantages of a cold climate and high labour costs are more than being met by the use of increasingly automated systems of production. (One grower in America reckoned that before he automated his production, the nursery staff spent more than half their time walking from one place to another.) As well as improving their production methods these countries have also gone in for more sophisticated marketing, like the 12 Dutch flower auctions.

The site of the Aalsmeer flower auction, the biggest, occupied 22 acres in 1972. Since then, contractors have not left the site, and today it covers more than 81 acres, possibly the largest commercial building in the world. Some 4,000 grower members and 2,000 non-members supply the Aalsmeer auction, and about 7,000 lorries leave the auction daily to distribute the

flowers and plants sold. The other big Dutch auction is held at Naaldwijk in the Westland region - the so-called "city of glass".

The Dutch pioneered the co-operative auction system to try to stop buyers playing one grower off against another (as still happens in Britain today). The growers, in a co-operative effort, introduced auctioning "by the clock". The clocks are situated centrally in various auctions rooms and have handles that move quickly backwards from 100 to 1, indicating a falling price for a particular lot as they revolve. The first buyer to stop the clock is the highest bidder. Push the button too soon and you pay too much; leave it too late and somebody else gets the goods.

The industry reckons that world consumption of flowers and plants could double between now and the year 2000. To achieve this, at least three things are needed: a dramatic increase in the number of sales channels; a bigger promotion effort, especially in America, where consumption is low (see chart); and the discovery of ways to extend the life of short-lived flowers and house plants.

The Dutch have high hopes that the relatively small British market will grow fast. Their markets in some other European countries show signs of saturation. West Germany, for example, recorded no increase in its imports of flowers and plants from Holland in 1985.

One survey showed that, in 1984, four out of every ten Britons bought no cut flowers at all, and five out of ten purchased no house plants. In 1985, the amount spent per head on flowers and plants by Britons was less than one-fifth that of the Norwegians and Swiss. This is usually explained by the greater attention paid to gardens in Britain and by an ingrained determination to keep house plants for years rather than to throw ragged specimens out and buy new ones, as continental Europeans do. In 1985, a test advertising campaign in Yorkshire increased sales of cut flowers by 60% in the country, against a national average of 24%, and of house plants by 70%, against a national average of 27%.

Further growth in world trade in floriculture is held back by the higgledy-piggledy nature of the business, and also by regulations on crop imports. The United States, for example, bans the import of any plant in soil.

Another constraint is cargo space. Although temperature-controlled seafreight containers are used to transport large exotic plants, especially from America to Europe, cut-flowers need to move faster. Airlines (with the notable exception of KLM) have proved slow to respond to the demand for airfreighting. Wholesalers say they do more than one-third of their trade in ten weeks of the year. Such peaks during the winter and early spring require more cargo space.

## PRESIDENTIAL ADDRESS

## R.N.Z.I.H. ANNUAL CONFERENCE — HAMILTON 1987

# HORTICULTURE — THE MERGING OF TOWN & COUNTRY

Ladies and Gentlemen,

As your President I would like to congratulate the Waikato District Council on setting up this Conference and for the preparation that has gone into it. I would also thank them for the invitation to present this address on the Theme of the Conference - "Horticulture - The Merging of Town and Country".

Over the last twelve months, since our Conference in Dunedin, there have been some traumatic social upheavals in New Zealand. People in the country in particular, who after a century of orderly farming, have had their foundations rocked, and in some instances completely destroyed. Town people too have felt the repercussions, and there is no doubt that we will continue to see many more social changes for some years to come.

Because our news, presented daily into our homes by newspapers, radio and T.V., is influenced mainly by the political scene, we are inclined to blame the government of the day for all this upheaval. This is true up to a point, but also it is an instrument, directing trends which are in motion throughout the world. Our news media promotes individual items or events, but these are straws in the wind giving an indication of far greater movements or trends which are taking place, often worldwide; but these trends can only be recognised by studying many reports or comparing the status quo from one year to the next.

This type of analysis is summed up in John Naisbitt's book "Megatrends", where his survey group reads between the lines of news items from all over the United States, and through them presents an overall picture of what is happening in society. He presents a trend of social behaviour.

In studying the theme of this Conference ' "Horticulture - The Merging of Town and Country", I would like to use this same approach, and by looking at several individual developments, establish the point that this merging is taking place. The conclusion to be drawn from this trend has a vital message, not only for this Conference, but also for all members of the Royal New Zealand Institute of Horticulture.

The merging of town and country I see as a greater understanding and awareness of what is happening in the two areas in the social, economic and cultural spheres. Let us consider where horticulture is helping to bridge the gap between the two groups.

1. Britain's Countryside Commission

A recent visitor to New Zealand, Mr Keith Turner of Britain's Countryside Commission said that the use of land was approaching the third revolution. The first was when nomadic man settled in villages to grow food. The second was during the Industrial Revolution when people in the villages grew food, not only for themselves, but also for those working in the factories in the towns and cities. Now he sees the third significant change where the countryside not only produces food, but has a whole range of uses, and the tax payer has has indicated that he is looking for quality of life from the countryside as well as food. This is indeed a merging of interests between the town and the country.

2. New Zealand Trends

Mr Turner in a paper presented at Lincoln College, indicated that there was a lesson in the British Countryside Commission work for New Zealand but this trend to the multi-purpose use of land is already taking place here. We see it in the keen interest by the community in our national parks and walkways and in the development of the countryside as a whole. This trend has also come out very strongly in the establishment of the Department of Conservation, and the intense public interest in what is going to happen to forests on the West Coast, and to the running of Molesworth station. It also establishes the point that Mr Turner makes that the tax paper is willing - or perhaps more correctly, is committed to paying for supervision of these areas.

A dramatic change to the multi-purpose use of land has also been seen in the dropping of sheep numbers; and the setting up of deer and goat farms all over the country is adding a park like effect to the landscape. In horticulture the planting of orchards, and also with them the establishment of living wind breaks is bringing a warmer environment, both in an aesthetic and a climatic sense.

3. Prosumer

Alvin Toffler in his book "The Third Wave" also lists the three important changes in the use of land and sees in this present age people moving from the towns on to a few hectares of land as a preferred way of life and becoming self supporting. In the industrial revolution we had the producer of food on the land and the consumer in the city, but in this present trend we have the producer and the consumer together whom Toffler gives the name of prosumer. This trend is taking place here at various levels of self support.

4. Horticultural Education

One of the strongest indications of the part that horticulture is playing in the merging of town and country is the wide spread interest in horticultural education. This cuts across the boundaries and is increasing at all levels - in our secondary schools, in our technical institutes and community colleges, and in the universities. In our own Institute the Examining Board is handling five times the

number of students it did a few years ago. It is becoming appreciated in the educational system that horticulture is not only the growing of crops for export; it is a way of life, a social study, a basic principle in self support. It is recreation and a cultivation of aesthetic values in the world about us. It is so encompassing that it cannot be held by town or country, but rather it brings about a merging of the two.

5. Home Gardening

One of the prime needs of the earliest villagers was the growing of food, and today the working of the soil and the growing of vegetables and fruit is still a basic part of our culture. Whether it is for food or for therapy, or for the creation of a pleasing environment, home gardening still meets a great need in the lives of many people. This growing of plants whether they are vegetables, apples, roses, orchids or herbs has a common interest and talking point for all gardeners, and whether they are from the town or country makes not the slightest difference. Through this common interest there is a merging of ideas and as more time becomes available in the future of recreation, we will see a still greater development of this interest.

6. Kiwi Fruit Boom

The kiwi fruit boom and along with it, the considerable investment of money by town people in land has brought a greater understanding of the problems of the country. Indeed to many it has been a revelation that plants do not grow by themselves without attention; and the story told at their mother's knee about the birds and the bees is in fact true. - That the flowers that grow on kiwi fruit do need bees to pollinate them before the fruit is set. - That there are problems with blue berries, stone fruit, grapes and asparagus with weeds, pests and insects: that if it rains too much or too little that the quality of produce can be affected and this makes it more difficult to get a satisfactory market return. All of these things have brought a greater understanding and more tolerance to the problems of making a living off the land.

It has also brought another side, and that is a deeper appreciation of the way of life in the country and as a result we find professional city people have taken up residence in the country to participate more fully in a more relaxed life style. Around Blenheim, where I live and around Hamilton, where we are holding the Conference, and also many other towns and cities in New Zealand, there are three, five and ten hectare blocks where city people have made their homes to either take up a full horticultural occupation or to share in country living.

To complete the picture of the flow of money from the town to the country and vice versa, despite the downturn in farming there has been the occasional investment of nest eggs from the country on to the stock exchanges of the cities over the last two years. Whether this has lead to a greater understanding of city values or a deeper meaning

to life I would not know. However, I am quite sure that the retirement of farming people into towns does help to give an exchange of ideas and values and does assist the merging of town and country.

7. Rural Programmes

Despite the inherent barrier between town and country, with many country folk indifferent to the housing problems in the cities, and city people not wanting to know of the problems of farming, through rural programmes on the media more people are becoming aware of the total New Zealand way of life. Through Country Calender on T.V., Land Line on radio and farming programmes in the daily press and magazines, more people are becoming aware of phylloxera on grapes, foot and mouth disease with stock or hail damage on fruit. In addition the setting up of guest houses in farm homesteads, and animal displays on farms, have stimulated the interest of town people in the countryside.

8. Nuclear Age

The nuclear age too is forcing people to have a fuller understanding of what is happening in the countryside. Chernobyl has been an education to the world of how, where and under what conditions their food is being produced. Recent seminars in this country have brought scientists together to help forecast the effects on food supplies of a nuclear war in the Northern Hemisphere. The New Zealand Planning Council has approached this Institute for us to give our views on what would be the effect on our food crops if nuclear bombs were dropped in Australia. People are being made to realise that food does not arrive on their table by some miracle, in packets marked with Watties on the side, but it is grown in fields, is cultivated, irrigated and harvested under all the elements of the weather. Also these supplies could be seriously effected by a nuclear fall-out and a nuclear winter.

CONCLUSION

In this merging of town and country through horticulture, I believe that many people are seeking a basic culture and a quality of life which gives a fuller meaning to living.

Richard Critchfield in his book "Villages" describes life and the people in many villages throughout the world and finds that villages possess a universal culture based on tilling the land, property and the family. He believes that with this culture and the newest technolgy on growing food there is a turn around of the long march out of the countryside into the cities, and in parts of this world, and for the first time there is showing up a reversal of this trend. The central idea in "Villages" is that village life is not only vital in itself, but is also the fundamental basis of all civilised behaviour, including our own.

The various examples that I have mentioned in this paper, are I believe, an indication of the same worldwide trend and the motives contained in it are also a seeking for a richer quality

of life. With this in mind, we should be aware of the danger of economic policies that could bring about a type of land ownership that does not bring out these inherent qualities associated with village life, and does not present the quality of life that people are seeking. A concept where the basic culture of the tillage of the soil, property and the family could be discarded.

All the examples of the merging of town and country which I mentioned are associated with horticulture and it is for this reason that this trend is of vital importance to this Conference and to the Royal New Zealand Institute of Horticulture. This merging, which I am sure will lead to a greater understanding and an awareness of the world about us, can be encouraged by you people engaged in horticulture, and there is no organisation that has such a wide coverage of all aspects of the subject as our Institute. With our members engaged at every level and in all spheres of horticulture, and our District Councils covering most of New Zealand, I believe that we are in a position to play a vital role in guiding the direction of this merging of town and country.

## HORTICULTURAL SALES CERTIFICATE

The oral and practical examinations for the Horticultural Sales Certificate were held this year in Dunedin, Palmerston North and Auckland. Eleven students were examined in these centres and the pass rate was 100%. The Institute acknowledges the valuable assistance given by the following Garden Centres for offering their premises and facilities for the purpose of the examination:

Nichols Garden Market
51 Timaru Street
DUNEDIN. (Mr Neville Dippie)

Palmers' Garden Centre
Great North Road
Glen Eden
AUCKLAND.

Hokowhitu Garden Centre
Albert Street
PALMERSTON NORTH. (Mr P.I. Hunt)

The assistance given by examiners and by Mr Neville Weal (T.C.I. Wellington), Mr P.J. Jew (Auckland), Mr John Bolton (Palmerston North) and Mr Neville Struthers (Dunedin), in helping with co-ordinating the exams is also greatly appreciated.

## GARDEN HISTORY GROUP

The Annual Conference in May featured a garden history workshop run by Rose Young from the Waikato Museum of Art and History. The workshop was a great success and made us look at the group and what we can realistically achieve in the future.

As a small group with limited resources our main objective must be to raise awareness of our garden heritage amongst the general population and also with those organisations, such as the Historic Places Trust, that are concerned with New Zealand's past. To do this we first of all have to find out the extent of our heritage. We need to carry out a survey throughout New Zealand to see what is left. To this end we have approached the Historic Places Trust asking if they would be prepared to mount a pilot study in the Wairarapa. This would be done in co-operation with the Wairarapa branch of the Trust and Institute members. Winsome Shepherd and Pat Adam (Historic Places Trust) have recently been to the Wairarapa for an initial meeting. More information on this in the next newsletter.

The structure of the group will remain flexible. Mike Oates, who is now on the National Executive, will be responsible for Garden History at that level. The group would also like liaison people in District Councils whom they can work through if necessary. This is important when that particular District Council is hosting the Annual Conference and plans to have some garden history sessions.

Apart from that we would like individual District Councils to get involved in projects at the local level. It's very heartening to see Otago getting involved in growing rare and endangered plants. How about other districts following suit?

# AWARDS — 1986 EXAMS

## N.D.H. (HONS) SCHEDULE 1

In the last bulletin Peter Brian Heenan was wrongly included in the list of N.D.H. holders. In fact he has N.D.H.(Hons.).

Congratulations Peter and apologies for putting you in the wrong list last time.

# FROM THE EXECUTIVE OFFICER

A big "Thank You" to Frank Dorofaeff and his organising committee who did such a good job of hosting the 1987 Annual General Meeting and Conference weekend. A happy, relaxed, and informative weekend was, I am sure, had by all who attended.

All District Councils have received copies of the minutes of both the A.G.M. and the National Executive meeting the previous day, but the following points may be of particular interest to members:-

1. SUBSCRIPTIONS FOR 1988

1988 Annual Subscriptions set at the AGM are as follows:-

| | |
|---|---|
| Individual Members | $38.50 (including GST) |
| Small non commercial Societies | $38.50 (including GST) |
| Sustaining Members | |
| i) Corporate Bodies | $88.00 (including GST) |
| ii) National Commercial Organisations | $148.50 (including GST) |
| Associate members (on application) | $25.40 (including GST) |

The A.G.M. also resolved that the 1988 subscription would be inclusive of the 1988 Annual Journal as approximately 80% of our members were already subscribing to the Journal.

The number of Bulletins will in future be reduced to three per year, but as we are going to have the work typeset the three issued will contain approximately the same quantity of information as previously contained in four issues.

The question of "Joint Membership" was discussed and it was decided to re-introduce a "Joint Membership" category which could be applied for in cases where two people were living in the same household.

The Joint Membership subscription will be 165% of an individual member's subscription. Hence the Joint Membership subscription for 1988 will be:-

$35.00 plus $23.00 = $58.00

Plus GST $5.80 = $63.80

Members wishing to take out "Joint Membership" will be required to advise me in writing of their wishes in this respect.

2. MEMBERSHIP OF NATIONAL EXECUTIVE

Following a postal ballot Mr Lawrie Metcalf of Invercargill was replaced on the National Executive by Mr Mike Oates of Wellington. The rest of the Executive remains the same as for the previous 12 months.

3. AWARDS AND HONOURS

The Institute extended its heartiest congratulations to the following recipients of Awards and Honours, which were presented at the AGM:-

Associates of Honour - A.H.R.I.H.

| | |
|---|---|
| Ronald Charles Close | Christchurch |
| Ralph John Ballinger | Blenheim |

Fellows of the R.N.Z.I.H. - F.R.I.H.

| | |
|---|---|
| Ronald Meric Davison | Auckland |
| Frank Dorofaeff | Hamilton |
| Ian Robert Gear | Hamilton |
| Christopher Gill | Hamilton |
| Eileen Betty Gross | Auckland |
| Alan Graeme Jolliffe | Lower Hutt |
| Ronald John MacDonald | Waiuku |
| Edward David Moyle | Christchurch |
| Michael Robert Oates | Wellington |
| Desmond D. Riach | Christchurch. |

4. 1988 A.G.M. AND CONFERENCE

The 1988 A.G.M. and Conference will be hosted by the Canterbury District Council and the venue will be Lincoln College. It is expected that the 1989 venue will be Tauranga.

5. BEAUTIFUL NEW ZEALAND SCHEME

Concern was again expressed at the government's decision to discontinue this scheme, and it was agreed that the Institute should once again communicate its views to the government.

Members may care to note that Periodic Detention labour is available in many areas for cleaning up road verges, parks, etc. People interested in following up this possibility should contact their nearest Probation Service.

OTHER NEWS FROM HEAD OFFICE

1. Student Handbook

The new Student Handbook has been completed and distributed to all registered students. It is a production which can be updated annually if necessary and hopefully it will answer a lot of questions that students have with respect to the range of qualifications offered by the Institute.

John Taylor did the bulk of the "spade work" for the publication before my office staff loaded the entire work onto

the computer.

There are bound to be topics that have been overlooked in the compiling of this booklet, and I would be pleased to receive comments from any members on how we might improve the next issue.

2. R.N.Z.I.H. Brochure

Mike Oates of Wellington is proceeding with the production of a colour brochure advertising the R.N.Z.I.H. and our public profile should be considerably enhanced as a result.

3. New District Councils

In July we hope to establish two new (or re-activated) District Councils. President Ralph Ballinger in Blenheim and Andrew and Judith Petheram in Nelson have been gathering support for Marlborough and Nelson R.N.Z.I.H. District Councils respectively. The advent of new District Councils is a most encouraging sign especially if a substantial number of our student members can be encouraged to take an active part in District activities.

4. Computer Mailing List

This Bulletin is the first occasion that we have been able to use our own Macintosh computer membership lists to generate mailing labels. Please check your label carefully and advise me of any inaccuracies. It has been a big job getting all the members' information computerised, and in the first instance there are bound to be a few problems. But once we have all the information loaded on accurately we will be in a much better position to provide accurate lists and statistics for District Councils.

Dave Cameron
EXECUTIVE OFFICER.

# R.N.Z.I.H. ANNUAL JOURNAL

The 1986/87 Annual Journal was printed in February and has been very favourably received by members and non-members alike. The Institute still has copies available and would like to use these to help increase the profile of the Institute and its publications and so attract new members.

With this in mind we are offering 1986/87 Journals for sale at the special price of $8.00 (including GST and postage). We would urge members to take advantage of this deal and buy a Journal to give to a friend or to someone they feel may be interested in becoming a member. Maybe you are a member and haven't bought a Journal yet?

Our Journal is one of the best horticultural publications on the market and we should make sure it reaches as many horticulturists as possible.

# OBITUARY

## JOHN P. SALINGER

*by Professor Ken Milne*

John Salinger's many friends were saddened to learn of his death, on 28 February 1987, so soon after his retirement from Massey University.

Dr John Paiba Salinger, or 'JP' as he was affectionately known by friends and students, was born in the United Kingdom. He graduated with a BSc(Hort) from Reading University in 1939 and later gained a National Diploma of Horticulture (NDH). Following service with the British Army he joined the National Agricultural Advisory Service in the United Kingdom as a Horticultural Advisory Officer.

After moving to New Zealand with his family he accepted an appointment as Senior Advisor in Ornamentals for the Department of Agriculture. This position necessitated extensive travel throughout the country and allowed 'JP' to establish contact with many nurseryment and flower growers. Provision of technical advice by personal contact, by articles and short courses firmly established John as a valued 'friend of industry'. His interest and expertise on plants and their identification led to his representing New Zealand on the International Society for Horticultural Science Commission for Nomenclature of Plants and the Section for Ornamental Plants. He was an Associate of Honour in the Royal N.Z. Institute of Horticulture, an organisation for which he was a strong advocate and worker.

He represented the University Grants Committee on the Loder Cup Committee and Massey University on the Eastwoodhill Advisory Committee.

His 20 year association with Massey University commenced with his appointment in 1967 to a Senior Lectureship in Horticulture, where he was initially responsible for teaching aspects of amenity horticulture, and the production of nursery and cut flower crops. As horticulture expanded at Massey University John's teaching and research became more specific, concentrating on the production, post-harvest handling and marketing of commercial flower crops. During this period his part-time studies for a Doctor of Philosophy degree (PhD) centred upon the development of methods for advancing the flowering of bulb crops and ultimately resulted in new opportunities for established crops.

Retirement early in 1986 soon saw the publication of his very popular and informative book "Commercial Flower Growing and Marketing". This was the first comprehensive book on flower growing produced specifically for New Zealand growers. It was based on 'JP's' lifelong experience in horticulture using overseas results together with his own findings demonstrating the scientific basis required for commercial success.

Until his death 'JP' continued his life-long affair with plants and the horticultural industry, through horticultural consultancy work. His interest in and sensitivity to the needs of the individual, and the willing assistance always given will be missed by many.

To commemorate John's interest in and contribution to ornamental horticulture, friends and colleagues have decided to establish a John Salinger Prize at Massey University. This will be awarded annually for the degree or diploma dissertation relevant to ornamental horticulture, which best reflects student report or excellence in presentation, literary style, and content. Contributions towards a fund to support this award can be forwarded to:

John Salinger Fund,
Department of Plant Health
Massey University
PALMERSTON NORTH.

## FROM THE CANTERBURY DISTRICT COUNCIL

Late last year the Canterbury District Council surveyed the Canterbury members to find out exactly what people would like in the 1987 programme.

37% of the members, that is 88 people returned their questionnaire. 70% of those who replied indicated they would like to attend field days and 65% indicated they would like evening lectures.

The questionnaire gave choices for times, seasons etc. and left room for suggestions.

Saturday morning was the preferred time for field trips. Consequently six Saturday trips have been scheduled for the year including nursery visits, a pruning demonstration and a question and answer session for Oral and Practical students.

An evening lecture plus guest speakers at event such as the presentation of diplomas and the Annual General Meeting have also been scheduled.

Hopefully the Canterbury membership is happy with the programme.

# THE INAUGURAL IAN GALLOWAY MEMORIAL LECTURE

Nearly 150 people filled the Long Room at the R.A. Vance Stand, Basin Reserve on Tuesday, 31 March to hear the Inaugural Ian Galloway Memorial Lecture given by Sir Michael Fowler. The event was organised by the Wellington District Council of the R.N.Z.I.H. with assistance from the Wellington City Council Parks Department.

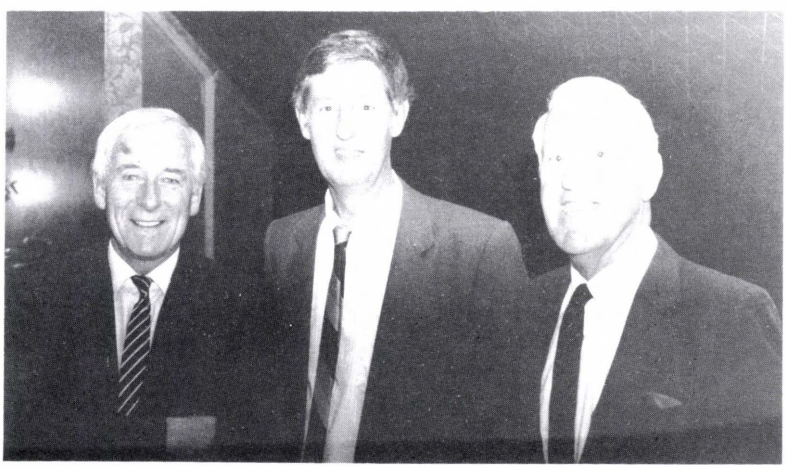
The evening was opened by Denis Hicks, Wellington District Council Chairman who welcomed the guests, including Alison Galloway, Ian's widow, who had travelled from Rotorua for the occasion. Mr Hicks then spoke about 'Ian Galloway - The Horticulturist', summarising Ian's horticultural career and his influence on Wellington's urban landscape.

Mr Ian McCutcheon, a former Wellington Town Clerk, then spoke about 'Ian Galloway - The Administrator', and provided an insight into the personality that made Ian so respected by the people who worked with him.

Sir Michael Fowler spoke on the subject 'Horticulture in the City' for the Memorial Lecture. The Lecture is reproduced in full later in the Bulletin.

The Lecture was followed by a graduation ceremony for students in the Wellington region. Dr Eric Godley, the Vice-President of the R.N.Z.I.H. presented National Certificates and Diplomas to several students, one travelling from Palmerston North and two from Levin for the ceremony.

The Wellington District Council plans to make the lecture an annual event, as it feels that such an event is a fitting tribute to Ian Galloway, a person who contributed so much to the Institute and to horticulture in Wellington.



Left to right - Sir Michael Fowler, Denis Hicks, Ian McCutcheon.

# HORTICULTURE IN THE CITY

*Sir Michael Fowler*

Members of the Wellington District Council of the Royal New Zealand Institute of Horticulture.

LADIES AND GENTLEMEN

I am privileged to have been requested to give the first Ian Galloway Memorial Lecture, and my subject is "Horticulture in the City".

I find the commission to speak most interesting, for during my fifteen years with the Wellington City Council, I spent considerable time with Ian Galloway, the Director of Parks and Recreation during all of those fifteen years, with Richard Nanson, then the deputy director, and many officers and staff of their department, including the plant nursery manager, Frank van den Bos.

I enjoyed Ian Galloway's company, his enthusiasm for this city, his skill not only in his chosen field but also in handling the increasing responsibilities of his office. Denis Hicks has spoken of him as the horticulturist, and Ian McCutcheon has spoken of him as the administrator, and both have done so excellently.

My own memories of my work with the City Council are highlighted by involvement with the Parks & Recreation Department, and its Director Ian Galloway. I was initially, indeed continuously suprised by the scale of the Departments responsibilities. It was some two years before I learned of the Council's vast reserve land holdings beyond the city boundary, such as Queen Elizabeth Park, Keith George Memorial Park and Williams Park. Indeed, it was some years before I knew of the Otari Open Air Native Plant Museum, a unique centre which I have come to love.

Perhaps my slow awakening to the Parks & Recreation Department activities was not that my primary interests lay elsewhere, but that I was not, during my first six years, a member of the Reserves Committee. This I can well understand, in that in my first year in 1968 when visiting the zoo with our children, I photographed the appalling pathways and enclosures, the then moth-eaten lions, the depressed wolves, the totally bored monkeys, and circulated phootgraphs to all Councillors with a request that the zoo be closed forthwith. This predictably enraged Bob Archibald, the very senior and much beloved chairman of the Reserves committee who thereafter kept me well away from his patch.

My view of the Zoological Gardens, as on the 43kms of beaches we administered, the five swimming pools, (nearly six now with the Wellington Aquatic Centre nearing completion at a price exceeding the Michael Fowler Centre), the 104 playing fields, the velodrome, the Basin Reserve, the all weather athletic track at Newtown Park, the synthetic hockey field at Mt Albert Park, the netball complex at Hataitai Park, the Renouf Tennis

Centre, Central Park, the Golf Course at Berhampore, the 97 equipped childrens' play areas, the Emerson Street nurseries, the walkways, the Botanic Gardens, - the glorious heritage of the Town Belt, - all these changed my earliest held view of the reserves of the Council, until I became as I now remain one of their strongest advocates.

This growing awareness led me to become a strong advocate of acquisition of lands to form the Outer Town Belt, an object still being pursued by Council, and to take a keen interest in the legislation enabling local authorities to require a reserves contribution from developers of land and buildings, for this most legitimate method of funding is now a primary source of financing reserve acquisition and development. Again, it made me a strong advocate of the policy of obtaining and developing inner city parks such as Glover Park. I always recall that this earliest of newly created parks in the existing city fabric was named for its benefactor Mr Glover, a strong trade unionist, who bequeathed his money to the Parks & Recreation Committee, his bicycle to the Transport Department, and his false teeth to the Town Clerk!

Glover Park, Rotary Garden Court, Cobblestone Park, Denton Park, Terrace Gardens and Flagstaff Hill, the upgrading of Oriental Parade, of Bolton Street Memorial Park, the Midland Park, hopefully the old BNZ site park, an increased Civic Square, the Harbour front development, all these do and will add immeasurably to the physical and intellectual recreation of the central city population.

Additionally, in my view, they will provide places of refuge and shlter as well as aerial evacuation for endangered persons when a major earthquake strikes Wellington, and that is one of the strongest arguments against the Mainzeal scheme for the BNZ site.

If over the years I changed my philosophy regarding the reserves of Wellington, so also did the community and indeed the Parks & Recreation Department and its committee.

The community began to request that sites be provided and that we develop land pursuits with which people can become involved and participate in - or, as David Welch, the City of Aberdeen Director of Leisure and Recreation Department said in his paper titled "Floral Entertainment" delivered to the Ilam Park Seminar in Brighton in 1985 - "parks are places of entertainment". They have to be seen as a series of viable spaces fitted with attractions to persuade the public to visit them and to spend the maximum amount of time within them. They pose the same problems as directing a theatre, hotel, concert hall or arts centre. In this scenario, horticulture is not an end in itself nor indeed is it any more important that the other elements of management such as ensuirng that buildings are kept in good order and repair, or that concerts and entertainments are attractive and interesting. Horticulture itself dominates simply because it is the largest single component commanding the majority of the resources, employing most of the labour and pervading the whole of the space, not because it is fundamentally more important. Indeed the flower bed is simply a form of floral entertainment and should be judged not by its horticultural excellence but

solely by its ability to attract and hold the eye of the public.

Similarly the test of the lawn is not whether it is green or can be looked at with pleasure -, but whether it can be used for walking, jogging, picnicking, footballing, cricketing, sitting or camping, without sustaining undue damage or losing too much of its good appearance.

David Welch, whose views I share completely, believes that horticulture is important in parks for reasons other than the traditional ones. In a city as a whole, it is important in the way it always was. It can be used to soften the outline of buildings, indeed sometimes helpfully it can hide them; it can modify the stark severity of roads and give a human scale to streets and squares. It allows the provision of focus points of colour to balance large buildings or to close a vista or to draw the eye.

Public planting does have the requirement however, that it would be on a civic scale big enough to stand in the wide environment of a town or city not in the manner of a horticultural confection nor as scattered fragment of floral litter. It ought to be a component of the structure of a place, not an afterthought or an ameliorant.

Let us now turn to the city of Wellington to illustrate these criteria.

Many years ago, a visitor to central Wellington may well have emulated the illustrious Dr Johnson who on visiting Brighton wrote - "If one had a mind to hang oneself for desperation at being obliged to live there, it would be difficult to find a tree upon which to fasten the rope". Fortunately, that is not the case in the 1980's, and not only the proven and ubiquitous Pohoutakawa, but now other evergreens and even deciduous trees. The excellent tree planting in the Lambton Quay median which so enhances the beautiful double S curve of that lovely place is a classic example, as are the very recent plantings in the pavement widenings and islands at the Mercer/Willis Street road realighnments, as at Wakefield/Victoria Streets and Featherston/Brandon Streets.

There was a past councillor who owns a toy shop on the corner of Wakefield Street and the then Farish Street who regularly regailed me with the nuisance value of autumn leaves near his shop front resulting from one meagre deciduous tree planted on that corner some six years ago. I was delighted to see that tree has recently increased to a veritable copse. I also assume that my colleague Tony Brunt must be revelling in these sensitive corner re-alighnments which he so strongly advocated in the late 1970s to better serve the pedestrian.

Wellington, unlike so many cities yet with some counterparts, is hill girt around a harbour. This means that it presents to us all the vast vistas of the ever changing dome of the sky, and the great vistas of the harbour waters, because we are often moving from the small flat areas against the harbour up into the hills, or vice versa, or indeed seeing the hills and the harbour from tall buildings or balconies thereon. The Council has recognised this, though possibly a little too two-dimension-

ally, with its view shaft policy. How much there is to do to enhance these vistas, even visions as they are so often, by the sensitive treatment of intimate foreground to give scale and contrast, not necessarily by planting - maybe sometimes by sculpture, even as the Romans did at Hadrian's Villa, and later, those glorious 18th century villas at Lake Como such as the Villa Balbianello, where sculpture stood in sillouette against the distant view down to the lake.

For example, I have often thought that the remarkable profile of the Iron Duke, centred in the Mt Victoria lookout designed by my late partner, William Gray Young, would be better positioned on the edge overlooking the city named for him, to give foreground and scale for the thousands of visitors and their photographs of Wellington from that remarkable point.

The most refined and developed small inner city part in New Zealand is the Midland Park, in which Ron Flook played such a pivotal part with Ian Galloway and Richard Nanson. It illustrates the delightful integration of levels, structures, paving, planting, water, lighting, shelter, entertainment, and has proved an uproarious success with the ultimate assessor, the public. It is this integration which is so essential, and that was possible because the design team was broad-based. It proved, as David Welsh would say, that the best horticulturists have always been quintessentially eclectic.

It is this generalist approach, the interest in fields beyond one's sphere of training, the desire to not have one's view stopped at traditional boundaries which is the hallmark of a great horticulturist - it was certainly the hallmark of Ian Galloway.

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# STUDENT SECTION

## EDITORIAL

Initially I was going to write this editorial without any mention of the weather, but on reflection, as horticulturists we refer to it not just as small talk, but as an integral part of our work. As we work with plants which are directly influenced by seasonal variations, our work programme is itself geared around these. For example, at this time of year we prune apple trees (while they are dormant), so as to harvest higher quality fruit in late summer.

Well, at least we have had some winter weather although the number of cold, wet south westerlies and heavy frosts are lower than normal for this season. Such has been the extended growing season this year that when the time for rose pruning came around, blooms and floral buds were still in evidence!

I hope the assignments are going well. There is no excuse for not doing them now that the Rugby World Cup is finished (great New Zealand victory!) and the long nights are here.

On cold days as experienced over winter, it is good policy to visit conservatories - at around 20°C they are most inviting!! While much of the outside garden is comparatively bare at this time of the year, tropical houses provide lots of interest. Many of these plants provide outstanding foliar contrasts both in colour and texture. The many crotons, *Codiaeum variegatum* var. *pictum* cultivars, (family: Euphorbiaceae), are good examples providing a brilliant range of colour including green, white, yellow, pink, red, orange, purple and near black. One of my favourite foliage plants for textural qualities is *Alocasia micholitziana*, (family: Araceae). The beautiful soft, felt-like dark green leaves have a white pinnate net vein pattern which provides stark contrast.

Biological husbandry is an accepted concept which is increasing in popularity both in the home garden and in the commercial sector. Two articles in this Bulletin serve to demonstrate the ever widening application of biological control. In addition to pest and disease control we now have a biological method of frost protection. The research work being carried out in this field is serving to make us more aware of working in harmony with nature and overall providing a safer environment to live in.

I trust you will find something of interest in this Bulletin. If not, then let me know what you would like.

Kind regards,

Nick Owers.

# FROST FIGHTING BACTERIA

*by Stan Fitchett*

*Reprinted with permission from 'Horticulture News' February 1987*

Growers could be using frost fighting bacteria if tests on a new strain of genetically engineered bacteria developed by scientists at the University of California are successful. A commercial firm already plans to market its own strain under the trade name Frostban.

Its understood frost damage to flowers and fruit is not caused directly by cold, but by ice crystals which form within plant cells. The role of bacteria in ice formation was discovered by Dr Steve Lindow, a plant pathologist with the University of California.

The bug of particular interest is *Pseudomonas syringae*. This bacterium is harmless to plants, but it produces a protein which causes ice to form at about -1.1°C whereas water in plant tissues will remain liquid at -5°or -6°C if these ice nucleating bacteria are not around.

"We isolated the actual gene in the DNA that had the ability to nucleate ice," explained Dr Lindow. "Once we had the gene in hand, we simply replaced the normal gene with a defective one that could no longer make ice. Now we have a new strain of bacterium that looks and acts exactly like the original, except for its special gene modification."

Ice forms at 0°C, but water requires a catalyst for ice crystals to start forming at that temperature. Without a catalyst water will stay liquid to -6°C.

## CATALYST NEEDED

*P. syringae* and the protein it produces act as the catalyst which start ice crystals forming on and in plant tissues.

"Above -6.5°C", explained Dr Lindow, "virtually nothing nucleates ice except the normal *P. syringae*."

These naturally occurring bacteria move on to the new flowers in the spring and begin propagating. Researchers believe they flourish by extracting nutrients from the new growth. If frost comes, there are plenty of these bacteria to nucleate ice crystals on, and in the flowers and buds.

It is hoped to use the new bacteria by spraying them over the trees just as the buds open. When these neutered bugs colonise the tree in large numbers there is no room for the nasties. If the foliage is covered with the non-nucleating bacteria the temperature can drop to -5°C before ice crystals begin to form.

## TIMING CRITICAL

Dr Lindow said, correct timing is critical. If the trees are

inoculated too late, the system will not work because the wrong strain of bacteria will have got in first.

Killing the ice nucleating bacteria with sprays does provide some protection against frost according to Dr Lindow. But simply killing them shortly before a frost will not help because the dead bacteria can still serve as nuclei for ice crystals.

He said many fruitgrowers have reported a significant difference in the amount of fruit from trees which had received strong applications of copper sprays before frosts which damaged unsprayed trees.

Dr Lindow's work has been mainly conducted with citrus, but he thinks the same technique can be applied to any frost susceptible crop. He says each crop harbours a slightly different strain of bacteria and each is liable to frost damage at different stages of growth.

COMMERCIAL STRAIN DEVELOPED

Advanced Genetic Engineering of Oakland, California, has developed a strain of *P. syringae* which it plans to market under the trade name 'Frostban'. Company officials say their variety is a mutant strain which was isolated from naturally occurring bacteria grown in their laboratory.

Frostban is still being tested under laboratory conditions. Environmentalists have taken the matter to court to prevent the release of the bacteria which they fear could cause a world wide catastrophe. A similar court action has blocked Dr Lindow from conducting field trials.

Dr Lindow believes the legal obstructions will be cleared away before too long. Scientists with the US Environmental Protection Agency don't believe trees with these new bacteria will be harmful, but until the legal interference can be disposed of *P. syringae* may have to wait in its bottle.

# HYBRID CYPRESSES: SHELTER, TIMBER AND LANDSCAPE

*Information from The Crop Research Division,*
*D.S.I.R.*
*Private Bag*
*Christchurch*

The number of tree species suitable for sheltering farm land is limited, especially for areas with difficult soils or climates. To improve the situation, Crop Research Division is evaluating a number of hybrid cypress species with promising attributes, including material specially imported and therefore new to this country. Because of their hybrid nature, any seed produced by these trees is virtually completely infertile so that propagation has to be done vegetatively from cuttings. This however, gives considerable uniformity of growth and habit within each species or cultivar, important attributes of good shelter. Some features of these trees follow.

*Leyland cypress* is a cross between macrocarpa and nootka cypresses (*Cupressus macrocarpa* x *Chamaecyparis nootkatensis*) and there are several cultivars including 'Leighton Green', 'Green Spire', 'Naylors Blue', 'Castlewellan' and 'Robinson's Gold', the two latter being golden forms and primarily of ornamental value.

Leylands are fast growing and very adaptable, inheriting their vigour from macrocarpa and their hardiness from nootka. They show exceptional tolerance of both drought and flooding, and also of severe cold, and can withstand salt winds better than macrocarpa and radiata pine. They perform well at moderate altitudes and because they do not set viable seed they can be established safely in sensitive hill sites where the spread of conifers by seeding is undesirable.

Pruning of side branches keeps Leyland shelterbelts thin and porous to provide the best shelter. "Fan" pruning is advocated, whereby the branches growing at right angles to the line of the trees are progressively removed, leaving the branches between the trees to provide the shelter. This attention improves wind firmness and the quality of timber from eventual felling of the trees.

Leyland timber is inherently valuable as could be expected with both the tree's parents capable of producing quality wood.

Leyland cypress is also a useful hedge plant, being attractive, withstanding repeated clipping and establishing rapidly.

Currently the Division is studying the morphology and environmental responses of the different clones and cultivars in detail in order to make more specific cultivar recommendations for individual sites. For example, 'Naylors Blue' has more surface wax on its needles which may make it more resistant to salt wind damage and thus the most suitable cultivar for coastal planting.

*Oven's cypress*. Selected in England from a sowing of seed from

a Mexican cypress, this tree is a cross between this species and nootka cypress *(Cupressus lusitanica x Chamaecyparis nootkatensis)*. Cuttings of the hybrid were released to the Division in 1982 and after multiplication the tree entered trials in 1983.

So far, it has demonstrated very vigorous, upright growth, with attractive red shoots and dark bluish-green foliage arranged in flattened sprays.

The tree is likely to do best on moderately exposed inland sites because it may be susceptible to salt wind damage on account of its *Cupressus lusitanica* parent.

Oven's cypress has potential to yield quality timber.

Alice Holt cypress. Named after the location of the British Forestry Commission's research station at Alice Holt Lodge near Farnham, Surrey, this tree is a cross between smooth bark arizona cypress and nootka cypress *Cupressus glabra x Chamaecyparis nootkatensis)*. It also entered the Division's trials in 1983.

The hybrid has soft grey-green foliage hanging in flat sprays from sinuous, upswept branches giving it ornamental value. It is likely to prove useful for shelter on dryish sites, again away from the coast this time on account of its *Cupressus glabra* parent.

Clone 850/329. This FRI numbered hybrid has been in our trials since 1973. Its origin is obscure, but chemical and morphological tests suggest it is a cross between a arizona cypress, *Cupressus glabra* or *C. arizonica*, and nootka cypress, *Chamaecyparis nootkatensis*, and probably with characteristics similar to Alice Holt cypress.

It has performed well in trials on inland sites of the South Island, showing moderate vigour, tolerance of drought and generally excellent form. However, near the coast the foliage suffers severe browning distortion and die-back.

Away from coastal influence the tree makes an attractive ornamental, with strong leader growth and upswept side branches bearing drooping foliar sprays.

# HORTEX GAINS EXCLUSIVE RIGHTS TO KERIBERRY

*(Reprinted with permission from 'Commercial Horticulture' December 1986)*

Keriberry ripens mid-winter when fresh fruit is scarce. Could it be another kiwifruit?

Could the Keriberry become one of New Zealand's main winter fruits? Grant Bittle, product manager for Hortex N.Z., believes it could.

Keriberry fruits all year round, but production peaks in winter. The size of a 50 cent piece, it is one of the largest of our berries. Tasting like a cross between a blackberry, boysenberry and raspberry, it is a fruit Hortex says has great potential.

Hortex have bought exclusive rights to Keriberry, *Rubus rugosus var, thwaitsii,* from Roy Hansen, who was growing the fruit in Kerikeri.

His fruit has been fetching handsome prices on the local market from hotel chains and restaurants, especially in winter when fresh fruit is scarce.

"The beauty of Keriberry is that it can be grown for the local market with a certainty of high returns because of timing. Consumers are paying premium prices for winter berryfruit in New Zealand. Prices paid in 1986, range from $20.00 per 2.4/kg tray in March to $94.00 per tray in June - the average price for 1986 was $60.00 per tray."

Grant is enthusiastic about Keriberry and says it has potential in New Zealand provided it is grown in the right areas. Frost tender, it will grow well in warmer climates such as in Northland and Auckland, and possibly in pockets in the Nelson region. "There is also a potential export market in Australia for fresh Keriberry during the winter months."

Hortex released its first batch of Keriberry plants earlier this month. Up to 60,000 have been propagated. Plants will be available to the public through mail order.

Keriberry will grow to about 2m tall and produce its first crop 18 months after planting.

Hortex supplied the following guidelines on how to grow the crop.

Soils and Shelter

Keriberry grows in a range of soil types. Sandy loams can be considered providing adequate water is available and organic matter is incorporated.

On heavier soils good drainage is necessary. If a pan exists

below the top soil, subsoiling or ripping will be required.

A pH of 6-6.5 is desirable.

To produce quality fruit, artificial or natural shelter is needed. Shelter cuts down water loss by transpiration, helps avoid loss of fruit by wind rub, and ensures rapid growth of the plant. In some situations shelter can be planted in the same season as the Keriberry plants.

Outer shelter should be a minimum of 10m high and internal shelter 5m, planted across the prevailing wind.

## Planting and Irrigation

Plant autumn to late spring depending on weather conditions.

Plants should be set to the same depth they were in the nursery. They need plenty of room and should be planted 1.5m apart with 3.5m between rows to allow for tractor access. Set post in ground so top wire is 1.5m from ground.

Irrigation is essential at establishment stage and thereafter depending on soil type and local rainfall.

## Pests and Diseases

Regular applications of fungicides and insecticides are needed for pests which include leaf roller caterpillar, bronze beetle, leaf hopper, and mites.

Birds are a big problem and can severely affect production. Established protective methods for berryfruit can be applied to Keriberry.

Bird netting, an expensive method, does not offer total protection as some small birds can penetrate normal sized mesh. If a smaller mesh is used pollination could be affected as bees would have trouble entering the growing area.

Alternative methods such as poison, bird scaring kites, carbide hangers and shooting, used separately or in conjunction with each other are normally sufficient for control.

Watch for stem borer. It is most active during summer months, and can be controlled by either removing infected areas or spraying.

Diseases which attack Keriberry include Botrytis (grey mould), and downy mildew (dryberry). Berries fail to develop properly if affected by downy mildew. Infected leaves show angular reddish blotches.

Can spot appears as purplish spots on leaves and young canes. Some curling of leaves occurs and the diseased spots drop out leaving holes in the leaves. Spots on the canes spread and become greyish white pits with purplish edges. Cracking of the cane may occur.

Although Keriberry crops all year round, they produce less

fruit during summer. This is the best time to apply chemicals which need a waiting period.

Control of Botrytis and Downy Mildew is greatly increased by correct pruning management.

## Nutrition and Fertilisers

If pre-planting fertiliser has been applied, it is unnecessary to mix fertiliser in the planting hole. If not, a balanced NPK mix of 8-4-8 is recommended at 40-50gms per plant. Fertiliser must be well mixed in the soil at the bottom of the hole and some topsoil replaced before planting.

In the first 12-18 months after planting, light applications of fertiliser are required. As each soil type is different, Hortex recommends a soil test be taken.

During the main fruiting season, a 300gm balanced NPK mix to 12-5-14 should be applied to a mature plant every six weeks.

## Pruning

Pruning must be done correctly and at the right time. After planting, let each plant grow uninterrupted for the first 3-4 months.

Prune out all small growth leaving only 2-3 of the strongest upright stems. As these stems grow remove all basal growth. After 6-9 months the plant will develop very thick stems from the base. Allow 5-6 of the thickest to reach about one metre before removing the former 2-3 stems. These stems produce the best fruiting wood and should be connected to support wires when tall enough.

Fruiting canes are distinguished by a short fat round tip. If the lateral canes have long internodes and a pointed tip, cut back to two nodes. Soon after two more laterals will appear and in most cases these will be fruiting canes.

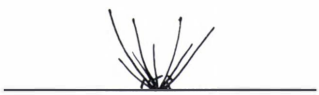
The fruit cane will grow 60-90cm away from the main stem and produce between 30-40 berries. As the fruit is developing more fruiting canes will be produced further up on the same cane. After the first fruit is picked, remove the cane leaving 3-4 of the secondary fruiting laterals.

After the second crop has been harvested remove the cane back to the main stem leaving two nodes and repeat the process.

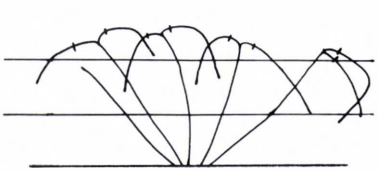
Hortex plan to release new information on growing techniques as it becomes available.

## Pruning Techniques for Keriberry

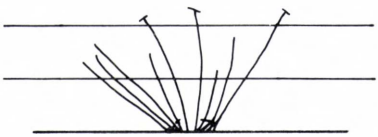
*Remove all basal growth leaving strongest stems*



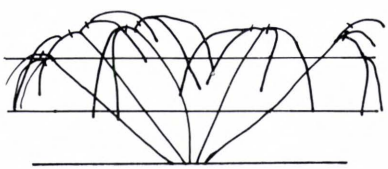
*First fruiting cane. After harvesting remove cane leaving 3-4 secondary fruiting canes that are already developing.*



*Allow 5-6 main stems to come. Once one metre high remove thinner old wood, remove tips to main stems. Remove any other basal wood.*



*After harvest of secondary fruiting canes remove back to stem and repeat procedure from top of main stem.*



## Harvesting

Keriberry takes six weeks to ripen from the time the flower is pollinated. After pollination the fruitlets are bright raspberry red. This darkens to purple then black as fruit grows and matures.

Ripe fruit is easily distinguishable. It is large and heart shaped.

Size and shape means it packs well into 250gm punnets, about 30 fruit to each punnet. The fruit is picked like a raspberry - the calyx remains part of the plant.

Fruit is packed upside down directly in the punnet to reduce bruising from handling. Each fruit is visibly inspected for blemishes at this stage.

Harvesting is carried out every second to third day. After fruit is picked and packed the punnets should be placed in coolstore at 4-6 degrees celsius until despatched.

It has a shelf life of about three weeks.

# NEW NAMES

*(Reprinted from Commercial Horticulture April 1987)*

All nurserymen accept the importance of correct botanical names being used for plants, however, there is often confusion to the extent that three or even four different names are often used for the same plant.

An example of this confusion has been with the name of hebes varieties in recent years.

Some time ago the N.Z. Nurserymen's Association set up a Nomenclature Committee which has from time to time put forward recommended name changes.

Accordingly, I am pleased to list latest recommended name changes from the committee as follows:

| Correct Name | Old Name |
|---|---|
| *Plumbago auriculata* | *Plumbago capensis* |
| *Hibbertia scandens* | *Hibbertia volubilis* |
| *Scadoxus multiflorus* | *Haemanthus multiflorus* |
| *Scadoxus multiflorus* 'Katherinae' | *Haemanthus katherinae* |
| *Scadoxus natalensis* | *Haemanthus natalensis* |
| *Erica erigena* | *Erica mediterranea* |
| *Erica herbacea* | *Erica carnea* |
| *Erigeron karvinskianus* | *Erigeron mucronatus* |
| *Verbascum creticum* | *Celsia cretica* |
| *Rosa glauca* | *Rosa rubrifolia* |
| *Lilium lancifolium* | *Lilium tigrinum* |
| *Rhododendron (Azalea) mucronatum* | *Azalea magnifica alba* |
| *R. (Azalea) mucronatum* 'Lilacina' | *Azalea magnifica mauve* |
| *Magnolia quinquepeta* | *Magnolia liliflora* |
| *Magnolia heptopeta* | *Magnolia denudata* |
| *Alsophila australis* | *Cyathea australis* |
| *Sphaeropteris cooperi* | *Cyathea cooperi* |
| *Alsophila tricolor* | *Cyathea dealbata* |
| *Sphaeropteris medullaris* | *Cyathea medullaris* |
| *Alsophila smithii* | *Cyathea smithii* |
| *Asphodelus ramosus* | *Asphodelus lusitanicus* |
| *Kunzea ericoides* | *Leptospermum ericoides* |
| *Lithodora diffusa* | *Lithospermum prostratum* |
| | *Lithospermum diffusum* |

# BIOLOGICAL CONTROL OF GRASS GRUB

## CHEAPER AND MORE EFFECTIVE

*by Dion Crooks*

*(Taken from M.A.F. AgriSearch Bulletin June 1986)*

Grass Grub, one of New Zealand's major pasture pests, is estimated to cost the country up to $100 million a year in terms of the damage it causes. Then there are the increasingly costly problems of insecticide resistance and chemical residues associated with control over the past 30 years. Against this background, it is heartening news that M.A.F. researchers have come up with a selective biological control which could become a commercial proposition and, they believe, provide cheaper and more effective controls.

Serratia entomophila sounds a bit like the latest West Indian fast bowling sensation. It's not. But given the right conditions, it's a discovery which could clean bowl one of New Zealand farming's deadliest enemies.

Research suggest *Serratia entomophila* - the bacteria which causes the killer honey disease in grass grub - can certainly sweeten the lives of many farmers. Under trial conditions, the bacteria - natural enemies of grass grub - have consistently reduced the number of healthy grubs by 70-80 percent and boosted winter dry matter production by about a third.

A group of Lincoln-based scientists believes the bacteria can be produced commercially as a biological insecticide. If so, farmers will be able to kill grass grub before it attacks pasture.

M.A.F's. Trevor Jackson, who has master-minded the research project in collaboration with the D.S.I.R. and Lincoln College's Microbiology Department, says the next step is an assessment to see whether large-scale production is on and at what price.

He lists several advantages for a bacteria-based insecticide:

* It is a "natural" product:
* It is selective, killing only grass grub:
* It has a long-term suppressive effect on grass grub. Recovery is slow and there has been no revival observed among grass grub populations collapsed by honey disease:
* It is safe. Test animals have shown no effects from even extremely heavy doses and the Pesticides Board has granted an experimental user permit for further development:
* It does not leave any harmful residues:
* The bacteria live in the soil and are reinforced by further bacteria from dead grass grubs:
* There is no indication of any grass grub resistance to the bacteria.

Furthermore, Jackson sees potential for such an insecticide in the urban market, as an aid to overcoming grass grub in lawns and sports fields. This is potential which would help make it even more commerically attractive.

*Serratia entomophila* attacks grass grubs specifically - in fact, it is found almost exclusively with grass grub in New Zealand. It has proved it can annihilate whole grass grub colonies unaided. Now, with a little help from its scientific friends, *Serratia entomophila* has the chance to get at more grubs than ever.

Honey disease was discovered in 1981 by M.A.F. scientists searching for the answer to natural collapses of grass grub populations in Canterbury.

In typically natural circumstances, grass grub numbers build up slowly after pasture is sown, peak four to six years on, then decline dramatically. Severe grub infestations are rare in older pastures as low numbers of grass grub and honey disease settle for peaceful co-existence.

Researchers found that, in causing the disease, the bacteria colonise the grass grub's gut. This stops it from feeding, turns it a honey colour and eventually kills it.

The killing process takes about 30 days. With a strike rate of around 80 percent, that represents a pretty traumatic blow to any flourishing grass grub colony.

But honey disease does not naturally reach epidemic proportions until after most of the pasture damage has been done - that is, during the time of peak grub numbers four to six years after sowing. Which is where Jackson and his colleagues come in. They reckon that by unleashing the bacteria onto the grass grub about the second or third year after pasture sowing, the population peak - and most of the pasture damage - will be avoided.

Certainly, trials in Canterbury, where grass grub has been a persistently bad problem and where research has been concentrated, have confirmed their belief. "We are working with a natural system and pushing it a little," explains Jackson. "We are changing the order of events and eliminating the damaging stage."

## New Direction

M.A.F. researchers investigating the grass grub problem are bringing a new emphasis and direction to biological control of pests. Their approach differs in the multiplication method.

Most biological control schemes focus around releasing an agent and allowing it to multiply naturally as it goes about attacking its prey.

But because *Serratia entomophila* can be easily cultured artificially in the laboratory, the M.A.F. scientists have reversed the thrust - multiply the bacteria artificially, then release it in insecticide form for use as a selective control.

# FLORAS

What are Floras?

A Flora is a published work devoted to the plants of a particular region, and also is usually restricted to a major segment of the plant kingdom (e.g. mosses, flowering plants). It is both an inventory of the species of plants of a particular group in a definite area, and a means of identifying and naming these plants.

Floras usually provide keys to aid identification, as well as descriptions and often illustrations.

For each species the following information is usually provided: scientific name, author citation, reference to source of original publication, other names by which the species has been known (scientific and common), detailed description of the plant, distribution within the area in question, status (whether endemic, indigenous or naturalised), and notes on ecology, as well as discussion of distinguishing characters, variation, relationships and other cultural and historical information.

Floras are compiled from all available sources, especially from (a) published specialist accounts, (b) information gained from herbarium collections, and (c) from the results of new work by the Flora writer on plants in the field or in cultivation. It is in the last two of these, and particularly the last, that a Flora makes its greatest contribution to botanical knowledge.

Why are Floras important?

1. Floras are basic reference works about the world around us.

2. Floras are the authoritative texts on which many popular books (botanical, agricultural, horticultural and more general works) are based, and from which informed decisions about plants can be made.

3. Floras provide a recommendation as to the correct names of plants in a region.

4. Floras, in aiding plant identification, give access to other information about plants (rarity, drug/poisonous/medicinal properties, uses as food and other traditional uses, etc.).

5. Major uses of Floras are in ecology and conservation (National Parks, reserves, rare plants etc.), horticulture and agriculture (identification of and correct names of weeds and cultivated plants), and education. They are used extensively both within the region for which they are written and other regions, particularly those which share many of the plants, by both professional and amateur biologists.

6. Floras take many years of careful work and serve as the

authoritative text on the plant group of their region often for several decades before they are revised in whole or in part.

7. Floras encourage botanical research by highlighting problem groups of plants, and in so doing may soon be out of date. Thus, in New Zealand, where many plant groups are not well understood, there is a need for frequent revision of Floras.

8. Floras are not produced with the aim of immediate economic gain, neither as books in themselves nor in their direct applications. However, they are essential to many economic pursuits, and are of major cultural and social value.

9. All major western countries and many third world countries have Floras or are producing Floras, and in many countries existing Floras are being revised. Civilised countries, such as China, have had Floras for hundreds of years.

## WASP PARASITE RAISES HOPES

A parasite which attacks wasp larvae has been bred by D.S.I.R. scientists at Lincoln, raising hopes of reducing New Zealand's growing wasp population.

The parasite, *Sphecophaga vesparum,* was released in parts of the South Island, including Christchurch, in May.

"It is effective under laboratory conditions," said Dr Barry Donovan, of the D.S.I.R. Entomology Division at Lincoln.

Studies had shown that the parasite attacked only wasps and threatened no other insect.

The common wasp, *Vespula vulgans,* has become more prevalent in the South Island this year, a trend which has worried scientists and ecologists. It is eating honey dew in beech forests, which is the food of native birds and lizards. It is also believed to have attacked bee hives.

Dr Donovan said that it would take up to four years before scientists could tell how effective the wasp parasite had proved.

The parasite, bred at Lincoln, was imported from Switzerland in the early 1980s.

# THE USE OF FERTILIZERS IN HORTICULTURE

Fertilizers are substances supplied directly or indirectly to crops in order to promote their growth, increase their yield, or improve their quality. The use and application of fertilizers has rapidly grown from an art to a science. Plants grow in accordance with certain rules which have been formulated mathematically as 'laws of yield formation'. They characterise the the relationship between increased fertilization and yields:

· LIEBIG'S MINIMUM LAW

The minimum law was established at the beginning of scientific plant nutrition and has been clearly illustrated many times. Plants require 16 elements for growth. Liebig's Law states that the yield increases in proportion to the minimum factor until the factor alone limits the yield. Stated simply this means that a deficiency in any one of the 16 indispensible elements is the controlling factor in the size and quality of the crop. Fertilization with nitrogen without simultaneous supplies of phosphate and potassium makes little sense. Neither does intensive fertilization with NPK without ensuring adequate supplies of the other major, minor and micronutrients. Only the correct ratio of primary to other nutrients ensures maximum yields.

The 16 essential elements are tabulated below.

| Macronutrients | Chemical symbol | Micronutrients | Chemical symbol |
|---|---|---|---|
| carbon | C | iron | Fe |
| hydrogen | H | manganese | Mn |
| oxygen | O | boron | B |
| nitrogen | N | molybdenum | Mo |
| phosphorus | P | copper | Cu |
| potassium | K | zinc | Zn |
| sulphur | S | chlorine | Cl |
| calcium | Ca | | |
| magnesium | Mg | | |

· THE LAW OF DIMINISHING YIELD INCREASES

This law states that the yield does not increase linearly with the fertilizer quantities applied, but that the increase gradually becomes smaller. When displayed graphically it gives a characteristic curve which reaches a maximum in yield and then

drops. Doubling the present day use of NPK fertilizers will not double yields or even raise them substantially.

While fertilization is always required for successful intensive growing of cultivated plants, mistakes in its use not only considerably reduce yield and income but may also have a detrimental effect on the quality of the produce obtained. What must be determined for optimum growth and productivity is the *right amount* of the *right kind* of fertilizer which is then applied in the *right place* and at the *right time*.

## THE IMPORTANCE OF USING THE CORRECT AMOUNT OF FERTILIZER

The use of excessive quantitites of fertilizer results in waste through nutrient losses by immobilization and fixation (accumulation of reserves difficult to mobilize), and the risk of damage to soil systems and plants. Undesirable oversupplies in mobile form in the soil may at first cause unnecessary intake (luxury consumption) and in extreme cases toxicity. This may be a result either of a single nutrient or of all mobile nutrients together as 'salt damage'. Young plants are particularly sensitive to salt damage. High salt concentrations in the growing medium harm the plant through inhibition of water intake and disturbances of nutrition.

Another risk inherent in using large fertilizer doses is the mutual interference of fertilizer effects, e.g. a reduction of magnesium intake because of extremely large potassium supplies, or mutual precipitation of nutrients in the soil caused by extremely heavy fertilization with phosphates.

Correct fertilization cannot render crops completely resistant to attack by pathogens, but the natural resistance of plants can be reduced by insufficient or excessive supplies of one or more nutrients. Deficiencies generally promote attack since protective mechanisms and defences have been weakened and metabolism distrubed. Nitrogen deficiency often signifies greater possibility of attack by weak parasites that would not normally be regarded as pathogenic. Phosphate deficiency promotes attack by harmful fungi, probably due to an unfavourable N/P ratio. Potassium deficiency primarily causes reduced production of carbohydrate giving rise to weaker cell walls which facilitates the entry of parasites. There are also more intermediate products of metabolism formed, i.e. more sugar instead of starch which promotes attack by aphids. Aphids carry virus infections from plant to plant. Calcium deficiency weakens the strength elements and facilitates the entry of fungi and damage by pests. Nitrogen excess often causes soft, spongy tissue and promotes attack by viruses, bacteria and fungi.

## THE IMPORTANCE OF USING A BALANCED FERTILIZER

Much of the fertilizer application in New Zealand consists of the use of single element or NPK fertilizers, particularly nitrogen. Nitrogen is of course, a major and necessary element for plant life. Excessive use of nitrogen however, can lead to relative shortages of other nutrients.

The objection to single element fertilization, whether of nitrogen or any other element, and to fertilization

which combines only two or three elements, is that they can provide only partial replenishment and therefore substitute one form of imbalance in the soil for another.

Plants absorb nutrients as molecules (e.g. carbon dioxide or water) and as charged particles (ions). These ions may be either positively charged (cations) or negatively charged (anions).

The nutrient elements are vital for the nutrition of the plant. Higher green plants, and this includes all cultivated plants, require 16 nutrient elements. These are carbon, oxygen, and hydrogen and 13 additional mineral elements: the major nutrient elements are N,P,S (absorbed as anions) and K,Ca,Mg (absorbed as cations). The micronutrient elements are Fe,Mn,Zn,Cu (absorbed as cations) and Cl,B,Mo (absorbed as anions). (Plants contain many other mineral elements which are necessary for the health of man and animals but are not necessary for plant growth.)

Nutrients are taken up throughout the growth of a plant but an adequate supply early in the growth of the crop is essential for efficient plant production.

Plants can take up nutrients through the root system and through the foliage. The energy required for active uptake of plant nutrients comes from the respiration of carbohydrates formed as a result of plant photosynthesis. Any factor that reduces the rate of photosynthesis by the plant will reduce the energy supply within the plant, and in the long term, reduce the rate of uptake of nutrient elements and ions.

Each nutrient element has a specific role within the plant and some elements have multiple roles. For a plant to function properly all the essential elements must be present in adequate amounts.

## THE IMPORTANCE OF APPLICATION IN THE RIGHT PLACE AT THE RIGHT TIME

Within the plant, water provides a transport medium for nutrients and atmospheric gases. Cell processes such as photosynthesis require water as a direct participant, and the maintenance of structural parameters such as turgor and volume also require water.

Plant cell growth is caused primarily by an uptake of water. The rate of growth of plant cells and the efficiency of their physiological processes are highest when cells are at maximum turgor, i.e. when they contain the maximum amount of water. Cell and leaf growth are highly sensitive to water stress. Turgor pressure is essential for cell enlargement and even under mild stress when turgor pressure is reduced by only a few bars, there is a significant decrease in growth.

The size of the root system and its distribution pattern in a given soil are determined to a great extent by soil moisture, oxygen and nutrient supply. Fertilizers applied to the soil have to be close to the water source in order to be used effectively by the crop. Where fertilizers are simply broadcast over the entire soil area the nutrient supply may become limiting to

plant growth. This is because nutrient reserves in the wetted volume of soil become depleted due to both plant uptake and the downward leaching of mobile ions such as nitrate and potassium.

Because of the relationship between root growth, water availability and fertilizer uptake, the addition of fertilizer nutrients to the irrigation water gives maximum efficiency. The depletion of nutrients from the rooting zone necessitates the continuous replenishment of nutrient reserves and by applying the fertilizer through the irrigation system it is possible to control both the placement and nutrient composition of the soil solution directly around the root zone.

Foliar application of nutrients is another method of fertilizer application. Although foliar application can satisfy only a part of the nutrient needs for most crops, its contribution can still be significant. Foliar feeding is often effective when roots are unable to absorb sufficient nutrients to meet active periods of growth. Supply of nutrients through the roots at certain growth stages can lag behind demand because of the reduced supply of photosynthates available for both vegetative and reproductive development. The amounts of micronutrients needed for correction of disorders are relatively small and foliar spraying with these nutrients is often much more efficient than soil application.

Absorption of nitrogen and its transport from sprayed leaves to other plant parts are generally good. Favourable results from foliar feeding are most likely to occur when the total leaf area is large. Any form of nitrogen applied to soil will eventually become nitrate and will be available for movement with irrigation water. The most efficient way of applying nitrogen is throughout the season and regulated to meet particular growth periods of the plant. While flexibility and timing are possible with fertilizer applications through irrigation systems it is important that sufficient nitrogen is available in the root zone early in the season and placement of water emitters in relation to plant root zones is critical. The direction of water movement in root zones will influence the availability of nitrogen. Once nitrogen fertilizer is in the form of nitrate it is susceptible to loss by leaching. However, correct water management should result in minimum loss. Foliar application of nitrogen will rapidly meet suspected deficiency.

Phosphate is absorbed by plant roots from the soil solution. The major factor determining phosphorus uptake is the concentration of the phosphate ions at the root surface, which is proportional to the phosphorus concentration in soil solution. The rates of uptake of phosphate by roots increases with increasing phosphorus concentration in soil solutions up to a certain limit. The strategy in manipulating phosphate fertilizer placement and timing is to ensure sufficient quantitites of solution phosphorus at points of greatest root activity at times of peak plant requirement. Phosphorus is rather immobile in soils. Movement is principally by diffusion, therefore movement is very slow and the distances of phosphorus movement over time are very small. Phosphorus uptake depends on the presence of available forms and foliar application of phosphorus has been claimed to be more economical under specific conditions than soil applications.

Plants need large amounts of potassium. Adequate potassium must be available throughout the growing period because potassium activates numerous enzymes, is required for stomatal opening and promotes translocation of photosynthates from leaves. It is a vital element in all energy relations of the plant. Many fruits have a large requirement for potassium and therefore it must be available up to the time of harvesting. High soil moisture alone will not result in adequate potassium uptake if the soil is low in available potassium. Potassium supplied in irrigation water ensures a readily available supply to actively absorbing roots. Foliar application of potassium is also beneficial but the danger of corrosion or burning to foliage necessitates the use of a fertilizer that has a completely soluble, balanced potassium formula.

Micronutrients, applied as chelates, are generally highly water soluble. Metal chelates are organic metal complexes in which the metal cation (e.g. iron, manganese, zinc, copper) is bound on several sides by chelating agents (like scissors or clamps) and is surrounded. Metal chelates are used as chelate fertilizers to prevent fixation to facilitate absorption through leaves.

The importance of fertilization with micronutrients is increasing. Deficiencies in micronutrients at medium levels, were formerly limited to poor soils. However in intensive horticulture and agriculture systems, better soils have been increasingly seen to be deficient. There are several factors involved in increased micronutrient deficiencies.

1. Higher yields imply greater removal.
2. Some high-yielding plants have a lower mobilization capacity and require a higher nutrient mobility.
3. More intensive liming, drainage and working can increase soil reactions which decrease mobilization of most heavy metals.
4. Intensive NPK-fertilization has a diluting effect on other nutrients.
5. Antagonistic action due in part to excessive fertilization with major nutrients.

Little research has been done on the efficiency of applying micronutrients through irrigation systems although results to date indicate excellent growth using this method of application. Foliar application of micronutrients however is known to be a most efficient and effective method of ensuring adequate supplies. A plant's total requirement may be satisfied by two or three foliar applications.

## THE IMPORTANCE OF USING HIGH QUALITY FERTILIZER

In most greenhouses nutrients are applied with the irrigation water. In order for fertilizer application to be successful, the fertilizer nutrients should be distributed uniformly throughout the irrigated area. Uniformity of distribution is dependent upon:

1. The efficiency of mixing.

2. Uniformity of water application.
3. Flow characteristics of water and chemicals in the distribution lines.

Nutrients applied through an irrigation system must not clog or corrode the system. Clogging occurs when dissolved chemicals present at high concentrations precipitate out and eventually form encrustations that restrict water movement. The correct pH level is also important as pH fluctuations can influence the stability of chelated nutrients causing them to break down and thus become unavailable to the plant.

All fertilizer programmes should be tailored to meet the demands of specific crops in specific growing situations. Any fertilizer used should have all of the following important features:

1. Performance testing of the products.
2. A balanced formula.
3. Complete solubility of the nutrient elements.
4. Complete availability of the nutrient elements.
5. Absence of any excess salts.
6. Non-corrosive.
7. Buffered to control pH.

# TO JAPAN WITH FLOWERS

*(Taken from M.A.F. AgriSearch, November 1986)*

Consignments of New Zealand Gentiana test marketed in Japan and North America this season have been very well received. The cut flower crop is a multi-million dollar business in parts of the northern hemisphere and New Zealand is well placed to supply out-of-season demand.

There is much interest in the crop among potential growers in New Zealand but limiting factors appear to be the small amounts of plant material and the lack of knowledge on cultural requirements and performance of the cultivars currently available. M.A.F. scientists intend to remedy this lack of knowledge.

They are setting up trials at Pukekohe and Levin to study which cultivars of Gentiana perform best in New Zealand conditions. Gentiana occupies 444 hectares in Japan returning 1800 million yen (about $NZ23 million). However, a shortfall of 20 percent in the supply of the crop has been estimated.

Japan produces flowers from June to October leaving a gap which New Zealand plants could partly fill from December to March. Gentiana is reputedly a cold climate crop requiring winter chilling to initiate flowering. But initial plantings at Pukekohe produced an abundance of flowers in the first season.

# DISTRICT COUNCIL SECRETARIES

### AUCKLAND
Mr B. Keene,
48 Pokapu Street,
Tititangi, AUCKLAND

### BAY OF PLENTY
Mr G.D. Mander,
Moffat Road,
R.D.1.,
TAURANGA

### CANTERBURY
Mr E.D. Moyle,
6 Winslow Street,
CHRISTCHURCH 5

### NORTH TARANAKI
Mrs L. Skipper,
50 Omata Road,
NEW PLYMOUTH

### OTAGO
Mr R.M. Scott,
83 Hawthorne Ave.
DUNEDIN

### POVERTY BAY
Poverty Bay Hort. Society,
P.O. Box 1275,
GISBORNE (Liaison Only)

### SOUTHLAND
Mr W.T. Wright,
12 Kew Road,
INVERCARGILL

### SOUTH TARANAKI
Miss E.A. Free,
23 Egmont Street,
HAWERA

### WAIKATO
Mr P. Woolley
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RNZIH Notable Trees Committee — P.O. Box 11-379, WELLINGTON

RNZIH Regional Horticulture Sub-Committee — P.O. Box 11-379, WELLINGTON

RNZIH Garden History Group — P.O. Box 11-379, WELLINGTON

# ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

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