Horticulture

in New Zealand

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

23

Autumn 1982

ISSN 0110 - 1153

HORTICULTURE

IN NEW ZEALAND

BULLETIN OF THE ROYAL NZ INSTITUTE OF HORTICULTURE
NUMBER 23, AUTUMN 1982

Cover photo : *Crocus tomasianas (iridaceae)*

The Editor welcomes articles, letters and news items for consideration for publication. Contributions should be addressed to the Bulletin Editor, P.O. Box 12, Lincoln College.

Registered at Post Office Headquarters, Wellington as a magazine.

~ Editorial ~

Editorials of any publication are very much the prerogative of the Editor and seldom does the Secretary get the opportunity for free rein of expression through this medium. Perhaps this is just as well, because secretaries, not only may be unskilled in editorial writing, but also may be inclined to use the opportunity for purposes other than those normally acceptable.

I assure all readers that, while certainly unskilled in editorial writing, my main reason for doing so on this occasion is to pay tribute to the previous editor Mrs. Barbara McCartney, who has recently resigned from the Institute staff.

Under her editorship "Horticulture in N.Z." became a publication of considerable merit, containing items of interest covering a wide spectrum of horticulture and Institute activities, culminating in Bulletin No. 22 with its student section edited by Mervyn Spurway. I am pleased to be able to record the appreciation of the Chairman and members of the National Executive, and no doubt every member of the Institute, for the valuable contribution made by Barbara McCartney during her 4½ years as editor of our quarterly Bulletin - her able services will be sadly missed.

Any shortcomings in this issue can be directly attributable to the fact that your National Secretary has no editorial experience and I ask members to bear with me until a replacement editor can be found for this important publication.

The growth of student membership is an increasingly healthy sign and as this category of member has now almost topped the 1,000 mark, the volume of administrative work entailed is increasing proportionately. To cater for this we have recently welcomed to our Lincoln Office staff, Mrs. Raewyn Young, whose principal responsibilities will be to deal with student affairs. Raewyn is a Lincoln College graduate with an Advanced Diploma in Landscape Technology and is continuing with part-time study at the College. As a student herself, we are sure she will have a good understanding of student problems and will be able to assist our own students in many ways.

- R.A. FOUBISTER
National Secretary

A.G.M. 1982

The 1982 Annual General Meeting of R.N.Z.I.H. is to be held in Hawera and your hosts on this occasion are the South Taranaki District Council. Details of the programme for the three days, 7th 8th and 9th May are contained in the brochure inserted in this issue of the Bulletin.

The success of this A.G.M. can be certain if every member who is able, makes an effort to be present. All can be assured of a warm welcome and an interesting and enjoyable meeting.

To assist the organisers, please complete and return the "Intention to Attend" slip attached to the programme insert, immediately.

REMITS TO 1982 A.G.M.

The following remits have been approved for submission to A.G.M.

Remit No. 1

As the National Executive meetings have been reduced in number from four to three per annum, we recommend that a standing committee with wide regional representation be formed to deal with urgent business arising between these three meetings. Power to act should be vested in this standing committee.

Northern District Councils
S. Davison/D. White.

Remit No. 2

That in view of the long interval between the Annual General Meeting of the R.N.Z.I.H. and the first meeting of the National Executive, that a short meeting of the new Executive be held during the Annual Conference, after the Annual General Meeting.

Northern District Councils
J.M.Dingley/I.Bradford-Smith

Remit No. 3

That the R.N.Z.I.H. expresses its concern that no specialist horticultural body is represented on the Beautiful New Zealand Co-ordinating Committee and request that a representative of the R.N.Z.I.H. be co-opted to this Committee.

Northern District Councils
J.M.Dingley/A.Tagg

Remit No. 4

That the R.N.Z.I.H. deputise media to give greater importance to amenity horticulture and stress that this does not necessarily mean gardening programmes.

Northern District Councils
J.M.Dingley/D.Bull

RNZIH CHAIRMAN'S REPORT TO ANNUAL GENERAL MEETING MAY 1982

Ladies and Gentlemen -

On behalf of the National Executive I am pleased to present the Annual Report for the year ended 31 December 1981.

IN MEMORIAM : we record with regret the passing of the following members during the year :

Miss J. Bercich - Whangarei
Mr. A. Farnell AHRIH - Auckland
Mrs. I.G. Gamlin FRIH - Hawera
Mr. G.N.J. Goldie - Levin
Mr. H.W. Honnor - New Plymouth
Miss V.A.M. McMillan - Tauranga
Mr. J.E. Russell - Timaru
Mrs. F.J. Scown - Hawera
Mr. J.W. Simpson FRIH - Palmerston North
Mr. W.J. Wilson FRIH - New Plymouth
Mr. E.R. Wright - Palmerston North

ASSOCIATES OF HONOUR : At the Annual General Meeting held in Christchurch May 2 1981 our highest Award bestowed to those who have given outstanding service to horticulture in New Zealand was conferred on the following :

Mrs. M.J. Amos - Auckland
Mr. G.B. Malcolm - Christchurch

The citations covering the Awards have been published in the Annual Journal of the Institute, No. 9 (1981).

FELLOWSHIP AWARDS : The following persons who have made a significant contribution to horticulture and to the Institute were elected to Fellowship of the Institute :

Mr. W. Fielding-Cotterell - Christchurch
Mr. R.A. Edwards - Christchurch
Mr. Milford Reed - Auckland
Mr. Noel Bowyer - Te Puke

HONORARY LIFE MEMBER : This was granted to Mrs. A.J. Endt, Auckland for her long and faithful service to the Institute.

MEMBERSHIP : Our membership now stands at 1,751 (1,683-1980). Of this number there are 840 student members. It is significant that the increase in membership is partly due to the fact that many student members are continuing to be members after completing their examination requirements. Because of the educational needs of students your Executive during the year approved the introduction of a students section in the Bulletin and the first 24 page section appeared in the December issue.

DISTRICT COUNCILS : In some areas there are very strong and active District Councils. In others there are problems in maintaining regular meetings with insufficient attendance to justify the organisation that is required. In this the Institute is not alone but it is very disappointing to the Secretaries, Chairmen and Committees who strive hard to maintain local interest. Capitation returned to District Councils during the year amounted to $1,998 but a healthy bank account is not the answer to non attendance at District Meetings. Like many other organisations we are competing with the comfort and entertainment of television in the home.

During the year District Councils were circulated with a draft copy of proposed Regulations governing the conduct of District Councils. Included was a proposal for the activities of "Friends of the Institute". After due consideration of the replies received from five District Councils your Executive has finally approved and adopted the Regulations and these have been made available to all District Councils.

SUB-COMMITTEES :

Regional Horticulture - this committee has had another active year under the Chairmanship of Mrs. W. Shepherd.

The Plant Evaluation Scheme (P.E.S.) - took another step forward with the distribution of plant material to several of the trial ground areas. At a recent meeting of the Executive it was recommended that the Scheme be enlarged to include the testing of uncommon and rare species of trees and shrubs with particular reference to potential street trees.

Notable & Historic Trees - During the year a further 15 trees were registered, bringing the total to 39 trees now within the Notable & Historic Trees register.

PUBLICATIONS : A total of 628 of this year's Annual Journal, No.9 were pre-sold and have been distributed. In addition, a further 112 copies were purchased by the N.Z. Society for Horticultural Science. This is an increase of 178 over last year.

Unfortunately Dr. M.B. Thomas is unable to continue as Editor and his contribution over the years is gratefully acknowledged.

The Bulletin continued during the year under the Editorship of Mrs. B. McCartney but we have also lost her valued assistance with her moving from Lincoln into Christchurch city.

Mr. M. Spurway, a final year N.D.H. student has accepted the Editorship of the Students Section of the Bulletin and for this we are very grateful.

1981 CONFERENCE REMITS :

Remit No. 1 Re the introduction of a one fee family subscription rate. National Executive has carried this forward for discussion at the next A.G.M.

Remit No. 2 Re the production of a yearly calendar of events. and dates to be published in the Winter Bulletin. This has been actioned and appears in this Bulletin.

Remit No. 3 Re the introduction of a paid Life Membership. This is a contentious item. Much is still under consideration.

Remit No. 4 Re increasing the capitation to District Councils from $1.50 to $2.00 per member. This has been actioned.

MEETINGS OF THE NATIONAL EXECUTIVE AND EXAM BOARD : Because of the high cost of air travel, both the National Executive and the Exam Board have agreed to conduct three meetings instead of the traditional four during the year. In order to expedite urgent matters the Exam. Board already has set up an emergency committee with power to act when required and the Executive will be proposing the formation of a similar committee. This will be discussed at the A.G.M.

EXAMINING BOARD : The steady increase in student numbers both for our own examinations and also for the Cadet Certificate in Horticultural Practice has placed a severe burden on the secretariat. In September a submission was presented to the Ministry of Agriculture & Fisheries seeking additional financial assistance, together with the appointment of a training officer to better serve the needs of students. An outcome of this request is still awaited. The Exam. Board report will be read at the A.G.M.

SECRETARIAT : Another extremely busy year has been concluded by the Secretary, Mr. R.A. Foubister and his assistants, Mrs. Enid Reeves and Mrs. B. McCartney. Mrs. McCartney resigned in February. Their absolute dedication to the affairs of the Institute and in particular to the running of the examinations system and service to students is an outstanding achievement and is duly acknowledged with gratitude.

FINANCIAL :

(a) General Account

Increases in capitation payments, salaries, Executive travel expenses and a grant to the Notable & Historic Trees Committee combined to reduce the 1981 surplus to $2,362 in the General Account. Subscription receipts increased by approximately $1,850, despite writing off $1,600 in bad debts and some $1,500 of subscriptions being in arrears.

(b) Examinations Account

Although income rose by $10,000 a corresponding increase in expenditure resulted in a deficit of $1,177 - a similar situation as occurred in 1980. Reaching a break even situation in this account hinges on accurate forecasting of income and expenditure at the beginning of the year and in todays inflationary economy this poses some difficulties.

(c) Publications Account

Sales of publications, notably the Floral Art Handbook and the Annual Journal increased by some $3,000 and costs of publications decreased by $1,000. The net surplus of $321 was achieved without recourse to the Publications Reserve as was the case in 1980 when $2,750 was transferred to pay for the Floral Art Handbook printing.

(d) Balance Sheet

The balance sheet of the Institute continues to remain healthy with accumulated funds standing at $17,495. The problem of cash flow being intermittent throughout the year is a continuing one. This was eased somewhat in 1981 by phasing term deposits to mature on a monthly basis. However, this system entails the penalty of reduced interest rates and less income from interest receipts, but was nevertheless necessary to ensure availability of cash to meet day to day commitments of expenditure.

GENERAL : The N.Z. Society of Horticultural Science was formed in September and a letter was sent expressing cordial co-operation.

The Executive has initiated the reprinting of the handbook, "Flowers for Shows", under the Editorship of Mr. E. Toleman.

Representations were made in writing to the committee set up to implement the Tunnicliffe Report which is promoting the teaching of Agriculture in secondary schools. Horticulture has been acknowledged as a discipline in its own right and the Institute's action has assisted in this recognition.

During the year letters indicating the Institue's support for policies which protect indigenous bush and forest were sent to the Commissioner for the Environment and the Minister of Forests and supportive acknowledgements have been received.

A letter has also been sent to the Hon. D. Quigley offering assistance to the Beautify New Zealand Scheme. Our concern was expressed in this letter that proper maintenance was of major importance for any scheme which was introduced.

CONCLUSION : In today's economic climate it is not easy to balance the budget and it is certainly very difficult to build up a reserve fund for future emergencies. General office expenses and in particular printing and postage continue to escalate. It is with much reluctance that the Executive has to recommend an increase in subscriptions to offset these rising costs.

As a broad policy it is clear that we must improve our Bulletin as a means of communication for our general members. Already mention has been made of the difficulties many District Councils are having in maintaining local membership interest. It is therefore becoming more apparent that the "head office" link with general membership must be strengthened. This will be a priority consideration of the new Executive.

I sincerely thank all members for their continued support and for their contribution to the welfare of the Institute.

- J.O. TAYLOR,
Chairman,
RNZIH NATIONAL EXECUTIVE

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

BALANCE SHEET

As at 31 December 1981

	Capital	Income		1981	1980
CURRENT LIABILITIES					
Accounts Payable			4,233		3,010
District Council Funds Suspense (Note 4)			953		876
Total Current Liabilities				5,186	3,886
PUBLICATIONS RESERVE (Note 2)				396	397
Accumulated Funds					
Notable & Historic Trees Committee (Note 5)			1,749		952
General Fund					
Balance 1/1/81			14,561		7,837
Add Excess of income over expenditure			1,185		6,724
Balance 31/12/81				17,495	15,513
TRUST ACCOUNT BALANCES					
Endowment Fund (comp)	1,384				1,319
F. Cooper Memorial Fund (comp)	1,064				981
J.A. Campbell Memorial Prize Fund	500	112			594
Junior Memorial Prize Fund	500	74			562
D. Tannock Memorial Prize Fund	500	137			552
P. Skellerup Prize Fund	1,850	232			1,352
R. Skellerup Prize Fund	50	117			89
D. MacKenzie Memorial Prize Fund	500	113			593
	6,348	785			
Total Trust Funds (Note 7)				7,133	6,042
				$30,210	$25,838

		1981	1980
CURRENT ASSETS			
Subscriptions in Arrears		1,580	1,425
Bank of New Zealand		7,031	11,845
Sundry Debtors		118	171
Books on Hand for Sale		1,946	3,519
BNZ Term Deposit		9,000	-
P.O.S.B. - Current Account		19	19
Total Current Assets		19,694	16,979
DEPOSITS HELD FOR FUNDS (Note 7)			
P.O.S.B. - General Funds			
- Special Funds	1,633		2,741
General Finance Co.	1,350		1,350
B.N.Z. Finance Co.	2,200		-
Christchurch City Council	1,050		1,050
Christchurch City Council (2)	400		-
B.N.Z. Savings Bank	103		876
BNZ Notable & Historic Trees	1,749		952
Palmerston North City Council	500		500
B.N.Z. Term Deposit	850		400
Total Deposits Held		9,835	7,869
FIXED ASSETS			
Office Equipment (at Cost)	1,546		
Less Accumulated Depreciation	865		
		681	990
		$30,210	$25,838

subject to audit

The notes on Pages 4 and 5 form part of and are to be read in conjunction with these accounts.

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE

GENERAL ACCOUNT

INCOME AND EXPENDITURE ACCOUNT

For the Year Ended 31 December 1981

		1981	1980
INCOME			
Subscriptions	12,883		11,021
Donations	63		102
Secretarial Services - Tree Crop Association			208
- N.Z.I.P.R.A.	798		462
Sundry Receipts			64
Interest	953		1,422
Net surplus from Publications Account (Note 6)	321		2,684
Total Income		15,018	15,963
Less EXPENDITURE			
Advertising	175		-
Capitation paid to District Councils	1,998		1,036
Salary, wages & secretarial services	5,383		3,485
Audit fee	520		450
Depreciation	309		247
Printing & stationery	801		808
Postages, telegrams, telephone charges	339		592
General expenses	339		351
A.G.M. expenses			163
Travel expenses	1,592		958
Grant - Notable & Historic Trees Committee	1,200		-
Total Expenditure		12,656	8,090
		2,362	7,873
Deficit Examination Account (Note 3)		(1,177)	(1,149)
EXCESS OF INCOME OVER EXPENDITURE		$1,185	$6,724

The notes on pages 4 and 5 form part of and are to be read in conjunction with these accounts.

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE

EXAMINATIONS ACCOUNT

INCOME & EXPENDITURE

For Year Ended 31 December 1981

INCOME		1981	1980
H.T.C. Enrolments	810		315
Registration	2,416		2,148
Examination Entry	6,886		6,030
Exam Recount Fees	36		86
Sale of Exam Papers	294		186
Government Grant	23,893		15,195
Loder Cup Committee	750		750
		35,085	24,710
EXPENDITURE			
Exam Board Expenses	3,735		2,957
Exam Fees and Expenses	7,219		4,598
Fees & Sundry Refunds	224		76
General Expenses	42		160
Loder Cup Committee	750		750
Hired Examination Room	135		-
Postage and Telephone	1,555		1,157
Printing & Stationery	2,357		1,667
Secretarial & Office Stationery	20,245		14,494
		36,262	25,859
EXCESS OF EXPENDITURE OVER INCOME TO GENERAL ACCOUNT		$ 1,177	$ 1,149

The notes on pages 4 and 5 form part of and are to be read in conjunction with these accounts.

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE

NOTES TO THE FINANCIAL STATEMENTS

NOTE 1 STATEMENT OF ACCOUNTING POLICIES

The following accounting policies have been adopted:

Inventories

Books on hand are valued at the lower of cost and net realisable value.

Depreciation

Fixed assets are depreciated on a straight line basis which will write off cost over a period of five years.

Interest Received

Interest receivable has been included in the accounts on a cash basis.

Subscriptions

The subscriptions in arrears are accounted for on the basis of those subscriptions expected to be received by the Executive.

NOTE 2 PUBLICATIONS RESERVE

The reserve is available for general publications of the Institute.

NOTE 3 EXAMINATIONS FUND

As from 1979 the Examinations Fund is accounted for by an Income and Expenditure Account. All costs relating to the Examinations Account are charged to that account and if expenditure exceeds income for the year the deficit is charged to the General Account. In those years where income exceeds expenditure the surplus is to be retained in the Examinations Fund for the benefit of subsequent years.

NOTE 4 DISTRICT COUNCIL FUNDS IN SUSPENSE

These are funds received from District Councils which are no longer operating. Interest is compounding and the funds are held separately in the Bank of New Zealand Savings Bank.

NOTE 5 NOTABLE & HISTORIC TREES COMMITTEE

The Notable & Historic Trees Committee is accounted for in these accounts to the extent of funds on hand at the end of the year. The funds represent the unexpended portion of grants plus interest received.

Balance of account 1 January 1981		952
Add Grant from General Account		1,200
		2,237
Less Secretarial expenses	108	
New labels	380	
		488
		$1,749

NOTE 6 PUBLICATIONS ACCOUNT

		1981	1980
SALES		6,713	3,724
Transfer from Publications Reserve		-	2,750
Less		6,713	6,474
Costs of Publication	4,819		5,878
Adjustment for decrease in stock on hand	1,573		(2,088)
		6,392	3,790
NET SURPLUS FROM PUBLICATIONS FOR YEAR		$ 321	$2,684

NOTE 7 TRUST ACCOUNT BALANCES

The funds in the Trust Accounts are represented by investments and bank accounts. The Capital portion represents the contributions of the donors and the income portion represents the unexpended portion of accumulated income to date. In the case of the Endowment Fund and the F. Cooper Memorial Fund no such distinction is made and the funds on hand represent a composite of capital and income.

District Council Funds in Suspense	876
Notable & Historic Trees Committee	1,748
Trust Account Balances	7,133
Total Deposits held for Funds	$9,757

CALENDAR OF EVENTS AND DATES OF SIGNIFICANCE TO MEMBERS

April 20 1982	-	Postal Ballot for National Executive closes
May 6 1982	-	Exam. Board meets, Wellington
May 7 1982	-	Executive Meeting, Wellington
May 8 1982	-	Annual General Meeting, Hawera
May 31 1982	-	Last date for new student registrations for November examinations
July 31 1982	-	Examination entries close
September 16 1982	-	Exam. Board meets, Wellington
September 17 1982	-	National Executive meets, Wellington
November 1982	-	Oral & Practical Examinations, Christchurch
(dates to be confirmed)		" " " " Lower Hutt
		" " " " Auckland
November 10-20 1982	-	Written Examinations about this time
December 31 1982	-	Financial year ends
January 20 1983	-	Exam. Board meets, Wellington
January 21 1983	-	National Executive meets, Wellington
February 15 1983	-	Nominations called for Associates of Honour of the Institute
February/March 1983	-	Four members of the National Executive retire by rotation. Nominations called for new members to stand for election.
Mid-April 1983	-	Deadline date (depending on date of A.G.M.) for all members to be given notice of the A.G.M., Annual Report and Balance Sheet
May 1983	-	A.G.M. Date and venue to be confirmed

JAMES ANDERSON MCPHERSON

In an obituary notice in Horticulture No.16, p.16, 1980 reference was made to Mr. McPherson's correspondence with Dr. Leonard Cockayne a distinguished early botanist in New Zealand. It had been Mr. McPherson's earlier intention that this correspondence be placed in the Alexander Turnbull Library. The letters were however presented by Mr. McPherson in May 1970 to Botany Division, DSIR, Lincoln as a gift and for safe-keeping. The four letters from Dr. Cockayne to Mr. McPherson were written in 1926 and are an important addition to the collection of Cockayne letters which are being assembled as a contribution to plant science history (see N.Z. Journal of Botany 17 : 389-416, 1979; Ibid. 18 : 405-32, 1980).

Jas. A. Hunter, AHRIH, Morrinsville

A.D. Thomson, Botany Division,
DSIR, Lincoln.

Ivy

(The third and last article in a series by Mr J.B. Laurenson)

HEDERA VARIETIES IN NEW ZEALAND.

Large green varieties :

Hedera helix (Species)	"English Ivy". Syn. *"Nigra"* on account of black berries. Medium green, five lobes, 6-7 cms. Young growth resembles "Ladder Fern".
Hedera h.	Lobata Major. Only known direct sport of English Ivy; middle lobe broader at base and longer, hence the name.
Hedera canariensis (Species)	Syn. *"Algeriensis", "Maderensis".* Dark green leaves further darkening and increasing in size with age. Red stems and petioles. One main lobe with two insignificant side lobes. Good ground cover.
Hedera colchica dentata	"Persian Ivy". Similar to *Canariensis* but stems and petioles green. (Not so far observed in N.Z.)
Hedera h. "Hibernica"	"Irish Ivy". Mature leaves deeper green, larger and broader than English - 10-12 cms. Differences in young growth not so noticeable.

Small green varieties :

"Baltica"	Similar to English but smaller and darker and deeper cut between lobes. Prominent white veins, wiry stems. Good ground cover for hard conditions. Origin Latvia and Russia.
"Bulgaria"	Deep green. 5 rounded lobes curved downwards. Veins not distinct. Red stems and petioles. Suitable for hot dry conditions.
"Chicago"	Similar to "Pittsburg" but slightly larger and brighter green and slower growing. Non self-branching.
"Cuspidata minor"	Dark green, matt surfaced, small 3-lobed leaves of hard texture, rounded rather than pointed, whitish veins. Petioles and stems red.
"Denticulata"	Medium size. 5 rounded lobes, particularly at base of leaf. Mid green.
"Digitata"	Fan-shaped leaves. 5 almost equal lobes, deeply cut. Whitish veins palmately arranged.
"Garland"	Medium size, dark green, deeply tri-lobed, sinus giving pleated or wavy effect. Good container plant.

"Hahn's self-branching"	Resembling "Pittsburgh" but more 3-lobed than 5. Strongly self-branching at growing point, making for good ground cover.
"Helvetica"	Three-lobed, matt surfaced, deep green leaves with prominent veins, on strong wiry stems. Origin Switzerland.
"Maple Queen"	Small three-lobed thick leaves, medium green, maple shaped, pale veins. Good indoor variety.
"Merion Beauty"	Small-leaved variety, varying in shape and size according to growing conditions. Much branching at axils. Stems reddish-brown. Origin Ireland.
"Nielson"	Similar to both "Chicago" and "Pittsburg" but leaves smaller and much closer together. Self-Branching pronounced. Origin California.
"Pittsburgh"	Probably first sport from *Hedera helix*. Leaves smaller, 5-lobed, central lobe longer and narrower.
"Purpurea"	"Black Ivy". Small leaves, bronze-purple, almost black in winter. Mid-veins prominent.
"Woodsii"	5-lobed leathery leaves, very flat. Mid-green, pale yellow veins.

Fan varieties :

"Fan"	5-7 lobes. Mid lobe slightly longer. Medium to dark green prominent pale green veins, deeply cut at sinuses.
"Fanette"	Broad fan-shaped, 7-9 lobes of even length. Leathery and harsh, very deeply cut at sinuses giving undulating margin. Self-branching but slow growing.
"Weber's Fan"	Rounded leaves, 5-7 lobes, undulate margin, light green veins. Popular container variety.

Cristate, Crenate and Undulate Varieties :

"Cristata"	"Parsley Ivy". Syn. "Crispa". 5-7 lobes, heavily crimped edges. Medium green darkening with age. Self-branching when established. Origin Jersey Island.
"Curlilocks"	Sport of "Cristata" but less cristate. Otherwise very similar.
"Fleur-de-Lis"	An unusual arrangement of 5 lobes, at first appearance unlike Hedera family. 3 large and 2 small lobes overlap in the three feathers pattern. Bright red stem and petioles, the colour showing also in the leaf centre.

"Fluffy Ruffles" Round brownish-green leaves, very contorted and crested edges. Self branching but slow growing.

"Hahn's Nana" Syn."Pixie". Slow growing, dwarf habit. Medium sized, slightly fan-shaped leaves. Good house plant. Resembling "Weber's California".

"Ivalace" "Lace Ivy". 5-lobed, dark green undulate, leathery leaves, self-branching compact growth. Unique high gloss to leaf surface.

"Manda's Crested" "Permanent Wave" ivy. Deep dull green fluted and undulate leaves. Reddish stems and petioles, colour also at base of leaf.

"Shamrock" Bright green, 3 lobes, side lobes overlapping middle one. Red stems and petioles in cold weather. Unusual formation often mistaken for "Fleur-de-Lis".

"Smithii" Larger than "Manda's Crested". 5-lobed thin, harsh leathery leaves. Mid-green, fluted lobes with downward curve. Young growth edged red.

"Walthamensis" Sharply indented sinuses between all 5 lobes, giving wavy appearance. Medium green darkening with age.

"Weber's California" Medium to dark green, 5-lobed, deeply cut and wavy in the sinus. Good container plant, also useful for ground cover.

Cordate or Heart Varieties :

"Cordata" Syn. "My Heart:. Large leathery dark green heart-shaped leaves, some slightly lobed.

"Deltoidea" Syn."Ovata". Somewhat like "Scutifolia" buy narrower and triangular. Overlapping at base.

"Scuitfolia" Small "Heart Ivy". Broad, thick, leathery lobe, deep matt green. Slight veining.

Pedate or Birdfoot Varieties :

"Director Badke" Sport of "Needlepoint". 3 lobes, blunt or rounded at tips.

"Gavotte" Sport of "Star". Pointed dark green leaves, twice as long as wide. Prominent veins. Origin Holland.

"Manda's Star" Large birdfoot type. 5 lobes, dark green with light veins.

"Needlepoint"	Dwarf, 3 narrow lobes, self-branching from axils. Non-climber.
Pedata (Species)	"Birdfoot Ivy". Syn. "Nepalensis". Light green darkening with age. Deeply cut 5 lobes, central one much longer. Prominent veins. Origin India.
"Pin Oak"	Sport of "Needlepoint". Medium green. Vigorous climbing habit.
"Plume d'Or"	"Irish Lace Ivy". Thin 5-lobed some 2-3 cms long and only 2 mm wide. Medium green bushy growth.
"Procumbens"	"Minima" or "Pigmy Ivy". Sport of "Needlepoint" Compact non-climber.
"Saggittaefolia"	Syn. "Taurica". 5-lobed central lobe very long. Deeply cut at base (sagittate), hence name. Mid-green, good climber but little self-branching. Origin Turkey.
"Star"	Syn. "Little Fingers". Suggests miniature form of "Sagittaefolia". Light green 5 finger-like lobes. Bushy habit, can be mistaken for fern.

Spear Type Varieties :

"Emerald Jewel"	Narrow leaf, 3-lobed, sometimes 5. Middle lobe long and slender. Deep shiny green. Prominent mid-vein.
"Green Spear"	5-lobed almost fan type, mid-lobe very prominent. Veins pronounced. Fast growing for ground cover or uprights.
"Soear Point"	Clear green, 3 lobes, some with two more short lobes at base. Deep wedge shape base. Prominent veins. Origin U.S.A.

Japanese Varieties :

"Conglomerata"	"Japanese Ivy", Dark green leathery undulate leaves, contorted stems, upright growing, non-branching.
"Conglomerata erecta"	Syn. "Conglomerate viridis". Stout stems, leaves broadly triangular and not undulate, arranged opposite. Dark green, prominent white veins. Very slow growing.
"Conglomerata minima"	Slow growing, upright habit, non-branching. Small leathery, tri-lobed, closely crowded leaves, dull green. Dark green stems. Used in Japanese Bonsai work.

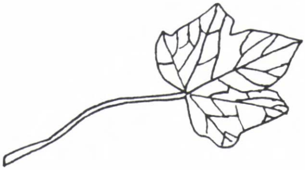
Large Variegated Varieties :

Canariensis var.	Syn. "Algeriensis", "Maderensis", "Foliis Variegatis". Thin leathery leaves, fresh green to dark green in centre, surrounded by regular margin of creamy white.
Canariensis "Golden Leaf"	Syn. "Ravensholst Var." Broad dark green leathery leaves, lightly lobed, 8-15 cm.long. Edges undulate at some stages of growth, Pale green blotch in centre of leaf.
Canariensis "Margino-maculata"	Syn. "Marmorata". Dark green and grey leaves with broad cream margin speckled with green. Red stems and petioles.
Canariensis "Gloire de Marengo"	Similar to Canariensis Var. but grey to grey-green in centre with irregular cream blotches at edges. Red stems and petioles.
Canariensis "Maculata Aurea"	Large creamy gold leaf speckled all over with green.
Hibernica Var.	Green blotch on pale cream leaf. Thin texture. Good indoor plant, inclined to burn in sun.
Hibernica Var.	As above but with green speckling on cream area. Variegation extends to petioles and stems.
Colchica "Dentato-Variegata"	Golden form of "Persian Ivy". Large leathery green leaves, lightly lobed and very slightly dentate, broad, deep cream margin. Petioles and stems pale green.

Small Variegated Varieties :

Butterscotch	Blunt pointed 5 lobes, slightly undulate and prominently veined in mature growth. Golden yellow deepening in full light.
Chicago Var.	Variegation gives blotched effect over whole leaf with more cream than green. Prone to revert.
Director Badke	Resembles "Needlepoint Var.", variegation less pronounced. Leaves rounded at lobe tips as with the type.
Glacier	Small 3-lobed leathery leaves, silver grey-green with white margin, narrowing with age, edge sometimes pink. Self-branching profuse grower.
Gold Child	Similar in shape to "Chicago Var." Colour dark green with regular margin of deepest gold.
Gold Dust	Syn."Chicago Var.Aurea","Lutzii". Small 3-lobed leaves, mid-green mottled with yellow or pale green. Profuse, self-branching. Origin France.

Gold Heart	3-5 lobed dark dull green leathery leaves with large yellow to gold central blotch. Colour deepens with strong light. Non-self-branching. Origin Italy.
Harold	Improved form of "Chicago Var.", distinctly 5-lobed with regular margin of creamyellow to mid-green leaves. Popular container subject. Origin Denmark.
Heise Denmark	Danish Ivy Syn. "Eva", which also originated in Denmark. Narrow leaves, 3-lobed, deep green with distinct cream variegation.
Little Diamond	Syn. "White Diamond". Young leaves true ivy shaped, small 3-lobed, green, wide white margin. Mature foliage smaller diamond shape, grey-green with less variegation. Self-branching but slow growing, good container or basket subject.
Marmorata minor	"Marble Ivy" syn. "Discolor". Small leathery dark green leaves, marbled entirely white. Tinged red in cold weather. Sport of "Gold Dust".
Needlepoint variegata	Very small narrow 3-lobed leaves. Cream-yellow over leaf, at times little green showing. Compact grower, self-branching from axils.
Sagittae-folia	Smaller and slower growing than the green form. Mid lobe long and curved downwards. Dark greyish green with cream-yellow variegation sometimes predominating.
Silver Emblem	Syn. "Hahn's Var." 3-5 lobed leathery small, pointed leaves, grey-green with cream border.
Silver King	Syn. "Pittsburgh Var." leaves pointed and triangular, grey-green with distinct even, white margin.
Tricolour	Syn."Marginata" and "Elegantissima". 3-5 lobed small leathery leaves, green and grey with cream margin, edges turning red with cooler conditions.
Weber's Californian Gold	Syn. "Var. California". Colour similar to "Gold Dust" but leaves distorted and misshapen.



Congratulations ~

to RNZIH students who gained the following awards at the 1981 examinations :

NATIONAL DIPLOMA IN HORTICULTURE : (Schedule One)

Mr. E.M. Wullems
Mr. D.D. Rowe
Mr. E.D. Moyle

NATIONAL DIPLOMA IN HORTICULTURE : (Schedule Four - Management)

Mr. J.W. Muller
MR. D.J. Lynch

NATIONAL CERTIFICATE IN HORTICULTURE : (Schedule One)

Mr. C.P. Christiansen
Mr. M.E. Gelling
Mr. R.A. Harris
Mr. J.M. Jackson
Mr. G.B. King
Mrs. C.F. Maiden
Mr. N.W. Owers
Mr. W.D. Phillips
Mrs. C.A. Ramage
Mrs. R.A. Rich
Mr. K.C. Weir

NATIONAL CERTIFICATE IN HORTICULTURE : (Schedule Two - Fruit)

Mr. B.R. Kean
Mrs. V.J. Palmer
Mr. M.J. Wainwright

NATIONAL CERTIFICATE IN HORTICULTURE : (Schedule FOUR - Management)

Mrs. M.I. Williams
Mr. D.G Evans
Mr. K.R. McGuire
Mr. G.P. Mackie
Mr. R.N. Smith

and to the Horticultural Cadets who gained the following awards at the 1981 examinations :

CERTIFICATE IN HORTICULTURAL PRACTICE : (Pip & Stone Fruit)

Mr. D.W. Andrews
Ms. T.J. Coutts
Miss K.A. Fern
Mr. W.J. Hughes
Miss J.I. Moulder
Mr. P.G. Moynihan
Mr. J.G. Norris
Miss S.J. Robb
Mr. M.G. Pitts
Mr. B.J. Hodgson
Mr. G.P. Roughton
Mr. A.J. Sambrook
Mr. W. Skipworth

.... continued on next page

CERTIFICATE IN HORTICULTURAL PRACTICE : (Citrus & Sub-tropical Fruit)

Mr. S.G. Ashe	Miss L.V. Graham
Mr. J.C. Babington	Mr. M.R. Lowe
Mr. R.J. Bavage	Mr. S.J. McTurk
Mr. S.P. Blomfield	Mr. G.I. Managh
Mr. D.A.W. Bird	Mr. D.M. Osmond
Mr. S.W. Butler	Mr. I.R. Smart
Miss M.M. Connolly	Mr. T.B. Smith
Mr. P.I. Cunliffe	Mr. J.F. Stewart
Mr. A.R. Eagle	Mr. W.P. Reynolds
Mr. L.A. Eagle	Mr. P.B. Taylor
Mr. M.J. Fox	Mr. C.J. Treloar
Mr. A.V. Gane	Mr. R.J. Van Rooyen
Mr. W.B. Gilmour	Mr. A.J. Wallis
Mr. K.C. Godsell	Mr. D.J. Whalley
	Mr. P.M. Wright

PRIZES AWARDED - 1981 EXAMINATIONS

Congratulations to the RNZIH students who were awarded the following prizes :

Mr. D.D. Rowe	- Cockayne Medal and Dugald McKenzie Prize
Mr. N.W. Owers	- J.A. Campbell Prize
Mr. J. Cartman	- David Tannock Prize
Mrs. A.M. Leydon	- Junior Memorial Prize
Miss P.F. Robertson	- Peter J. Skellerup AHRIH Prize
Miss M.J. Todd	- N.Z. Vegetable & Produce Growers Federation Prize
Mr. N.J. Arbury	- N.Z. Nurserymen's Association Prize
Mr. J.W. Muller	- Whangarei District Council Prize

GARDENING WITH MAZUS

MAZUS RADICANS - is a creeping herb which hugs the ground, extending in size as each node produces roots and gains sustenance.

A stream or pond edge or a simple hollow affording dampness makes the ideal setting and gives the cultural conditions necessary for optimum vegetative growth, while the degree of exposure to sunlight regulates the amount of flower produced.

The oval shaped leaves are a soft green, speckled brown, smooth underneath and covered with soft hairs above, presenting a velvet surface. The mat of leaves is given an added lift in early summer with the white and blue flowers appearing above the foliage.

The flower structure shows the obvious membership within the family Scrophulariaceae.

N.Z.I. TRUST

TEMPLIN TRAVELLING SCHOLARSHIP

IN ENGINEERING AND HORTICULTURE.

The New Zealand Insurance Company Limited, as trustee of the John Richard Templin Travelling Scholarship Trust is now calling for applications from Engineering Graduates of the University of Canterbury and Horticulture or Botany Graduates of Lincoln College or Graduates who have obtained a National Diploma of the Royal New Zealand Institute of Horticulture from Lincoln College or through the Reserves Department of Christchurch City Council.

There are two Scholarships of $10,000 each and they are available for study in the United States of America or Canada and are normally tenable for one year. It is desirable that applicants should intend to study at Ohio State University U.S.A.

Application forms are available from the Trust Department, The New Zealand Insurance Company Limited, Private Bag, Christchurch.

Closing date for applications is 31.5.1982.

DISTRICT COUNCIL NEWS

We sincerely apologise to all those District Council Secretaries who sent in reports of meetings, social events and other items of local and general interest for inclusion in this issue.

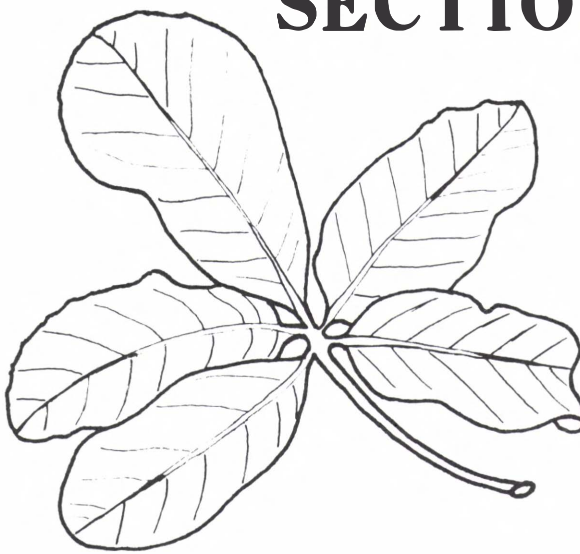
Regrettably, our printing deadline just does not permit time to read, select and edit the material you have provided for this popular section of the Bulletin. However, please continue to submit items for publication and we will endeavour to catch up on District Council News in the next issue, even to the extent of allocating more space to do so.

- Acting Ed.

Welcome to the following new members :

Mrs. J. Luckin, New Plymouth
Mr. R.Y.W. Foon, Wellington
Mrs. A.E. Saunders, New Plymouth
Cynthia Christie, New Plymouth
Mr.&Mrs.J.L.Bakewell,New Plymouth
Miss D. Blair, New Plymouth
Mrs. M.M. Shekleton, New Plymouth
Mr. A.W. Naish, Oamaru
Mr.&Mrs.O.R.Sutherland, Masterton
Mrs. M. Stephenson, New Plymouth
Mr. R. Doyle, Christchurch
Mr. & Mrs. A.H. Langdon, Auckland
Mr. & Mrs. J.C. Turpin, Auckland
Dr. John Rogers, Auckland
Dargaville High School
Mrs. C. Street, New Plymouth
Iris M. Phillips, New Plymouth
Mrs. J.E Harrison, Gore,
Dr. A. Bell, Lower Hutt
Thames High School
Mr. M. Oates, Wellington,
Dr. K.R.W. Hammett, Auckland
Messrs. Frank M. Winstone,Auckland
Mrs. C.J.C. Fookes, New Plymouth
N.L. Pope, Carterton
N.J. Ramage, Timaru
R.N. Reynolds, Te Puke
C.Y. Robertson, New Plymouth
I.W. Robertson, Invercargill
P.M. Robertson, Hamilton
B.P. Stock, Taupo
S.K. Hughan, New Plymouth
J.M. Johnston, Whangarei
P.J. Lissington, Palmerston North
S. Mecredy, Auckland
M.G. Moreton, Auckland
R.T. Munro, Levin
R.M. O'Connor, Christchurch
K.A. Pamplin, Mangere East
A.C. Perrott, Te Awamutu
N.J. Adam, Auckland
G.J. Bowler, Hawkes Bay
K.F. Budd, Wellington
R.M. Campbell, Auckland
S. Faleafaga, Wellington
N.J. Fleming, Christchurch
J.A. Gavin, Hamilton
W.H. Gibson, Mosgiel
S.A. Fogden, Tauranga
T.J.L.Foote, Christchurch
L.C. Hibbs, Auckland
G.J. McPherson, Palmerston N.
J.S. Overmars, Christchurch
B. Schar, Hamilton
A.R. Tate, Tauranga
P.G. Andrews, Auckland
R.G. Ayto, Hastings
G.C. Barnett, Christchurch
J.P. Bretherton, Hastings
R.F.S. Browne, Morrinsville
G.A. Caphill, Auckland
A.J. Cooper, Geraldine
R.B. Douglas, Te Awamutu
S.J. O'Malley, Napier
D.J. Potts, Hastings
S.J. Richardson, Dunedin
M.A. Simmons, Auckland
K. Turepu, Rarotonga
D.N.B. Whyte, Auckland
A. Aucamp, Auckland
J.A. Biss, Hamilton
K.A. Burgisser, Hawera
V.J. Hall, Northland
M.D. Hoare, Te Puke
R.L. McInnes, Auckland
M.H. Marquet, Christchurch
P.W. Banks, Wellington
S.R. Currie, Hamilton
W.M. Davison, Hastings
A.G. McDermott, Waitara
K.F. Poppelwell, Huntly
S.A. Schwalger, Hastings
T.P. Solomona, Rarotonga
D.J. Sampson, New Plymouth
D.B. Mapson, Cambridge
J.S. Elmer, Dannevirke
L.P. Gilbert, Warkworth
A.J. Heine, Wellington
H.E. McDonald, Winton
D.M. Murray, Auckland
P. Roberts, Manawatu
P.D. Sleep, Waihi
M. Stephens, Auckland
A.K.G. Treacher, Wellington

STUDENTS' SECTION



EDITORIAL

As the horticultural industry expands in New Zealand the demand for qualified horticulturists must likewise increase. Student registration with the RNZIH (not including cadets) has increased 250% since 1976 to 912 (1981 figure). Students registered total more than both Lincoln College and Massey University horticultural students combined. I have observed an increased requirement for NDH in horticultural vacancies advertised recently. You are part of this growth industry.

The Institute's function extends beyond its examining role for the various diplomas and certificates. It is also an aid to students by publishing an excellent Annual Journal, the quarterly bulletin, and organising field trips and seminars through the various local branches. These are aimed to be both educational and of general interest. In times when a dollar does not go very far it seems like good economic sense to get as much for your Institute fees as possible. Please participate.

Good luck with your study.
Merv Spurway

PREDATOR FOR TWO-SPOTTED SPIDER MITE ESTABLISHES IN ORCHARDS

by

J.T.S. Walker, C.H. Wearing, C. Proffitt and J.G. Charles, Entomology Division, D.S.I.R.

(from The Orchardist of New Zealand November 1981)

A new insecticide-tolerant predatory mite has established in orchards in Hawke's Bay, Nelson, the Waikato and Canterbury. The predator, *Phytoseiulus persimilis*, has a voracious appetite for two-spotted spider mite *Tetranychus urticae*.

This predator was first introduced to New Zealand in 1967 by a former scientist with Plant Diseases Division, DSIR, Dr Ken Harrow. It was introduced because it had been shown capable of controlling two-spotted spider mite in glasshouse crops in Great Britain. For this reason the predator was released in commercial glasshouses throughout New Zealand. Despite good results under experimental conditions it did not establish successfully as a predator providing consistent control of two-spotted spider mite in glasshouses and was not considered further.

In 1977, with increasing interest in integrated control programmes for two-spotted spider mite, Dr Howard Wearing and Mrs Anne Gunson of Entomology Division introduced an 'outdoor strain' of *P. persimilis* from the south of France. It was held in quarantine until 1978 when releases were made, this time in several locations, outdoors and adjacent to crops that host two-spotted spider mite, such as apples and berryfruit. It was released into adjacent shelter trees and unsprayed areas as these situations often host two-spotted spider mite which subsequently infests crops. More importantly it was thoughtthat pesticides used to control insects would also eliminate the predator if it was released directly on to these sprayed crops. Predators were released in Auckland, the Waikato, Hawke's Bay and Nelson.

Early in 1979 at a site in Hawke's Bay, where *P. persimilis* had been released into a shelter belt adjacent to an orchard, dense populations of the predator were found in association with two-spotted spider mite. Not only were they recovered from the shelter trees but also from the intensively-sprayed apple trees where they were feeding on two-spotted spider mite. This survival in the presence of orchard pesticides was not expected, but having apparently survived and successfully established, large numbers of this predator were distributed on shelter trimmings to similar locations in Hawke's Bay by M.A.F. horticultural advisory officers.

During the 1979-80 season *P. persimilis* again appeared at the original release site in Hawke's Bay, this time preventing the development of damaging two-spotted spider mite populations in the shelter trees. They were also now very numerous throughout the orchard, greatly helping the control of two-spotted spider mite. Meanwhile it had also established at later release sites and elsewhere in Hawke's Bay orchards; by the end of the season it was found in more than 20 orchards, obviously surviving considerable pesticide programmes.

Following this increase in *P. persimilis* numbers in Hawke's Bay orchards, samples of the predator were sent to the Mt Albert Research Centre for assessment of their resistance to the commonly used insecticide, Gusathion. The tests found this predator to be significantly more tolerant to Gusathion than the European red mite (*Panonychus ulmi*) predator *Typhlodromus pyri* in Hawke's Bay. This result, together with its apparent tolerance of commonly used fungicides, confirmed the important potential of this predator for use in an integrated mite control programme for two-spotted spider mite.

Since this test *P. persimilis* has become widespread in Hawke's Bay orchards and is now also found to be increasing in orchards in Nelson (E. Ashley, pers. comm.) the Waikato and Canterbury (W.P. Thomas, pers. comm.). It has also established at the Auckland release sites. Last season it successfully controlled potentially damaging populations of two-spotted spider mite in several Hawke's Bay orchards without the need for intervention with miticides. In some situations it did not provide adequate control and use of a miticide was necessary; this almost certainly reflected the different levels of toxicity of the various insecticide and fungicide programmes used. A high priority for future work by DSIR scientists, will be to determine pesticides for insect and disease control that will not harm *P. persimilis*.

P. persimilis has also demonstrated its ability to control two-spotted spider mite in other horticultural crops; for example, orchids in Hawke's Bay and glasshouse roses in Auckland. It has been found on a wide range of plants that host two-spotted spider mite including: berryfruit, stone fruit, kiwifruit seedlings, French beans, pepinoes and many species of weeds and shelter trees. While two-spotted spider mite is its preferred prey, *P. persimilis* also feeds on active stages of European red mite in apple trees in mid and late summer and is capable of reducing dense infestations rapidly.

The behaviour of *P. persimilis* in the orchard environs is still being investigated. It overwinters in the ground cover vegetation beneath trees and in weeds on the orchard or crop perimeter. Two-spotted spider mite overwinters in these situations as well as on the trees. In spring adult females of the two-spotted spider mite begin to feed on clover and weeds in the ground cover and by early-mid summer their numbers have increased dramatically. Likewise *P. persimilis* begins feeding on two-spotted spider mites present on the clover and weeds and is frequently numerous on these by mid-summer. With two-spotted spider mite numbers still increasing on clover and weeds, migration into the trees occurs in mid and late summer. It is during this time that the predator can be found in the trees having followed the movement of its prey. High numbers of two-spotted spider mite are quickly controlled in the absence of pesticides toxic to the predator. *P. persimilis* is extremely mobile and, in the absence of two-spotted spider mite or alternative food sources in the apple crop, its numbers there decline rapidly as it moves out in search of other prey. In other crops such as berryfruit *P. persimilis* may persist throughout the year on the crop plants and the ground cover.

The potential of *P. persimilis* in integrated mite control programmes in New Zealand is considerable. It successfully overwinters outdoors in our mild climatic conditions and does not require annual re-introductions on perennial crops. It has demonstrated its ability rapidly to reduce dense infestations of two-spotted spider mite in both orchards and glasshouses. Its ability to survive diverse and intensive pesticide spray programmes in these different crops is encouraging although research is still necessary to determine the range of pesticides which are harmless to *P. persimilis* . Clearly it is a predator which shows great potential for the integrated control of two-spotted spider mite in a range of horticultural crops and should complement the existing integrated mite control programme for European red mite in apple orchards.

ENERGY CONSERVATION IN THE GREENHOUSE INDUSTRY

HOUSE MODIFICATIONS AND CLADDING MATERIALS

by

J.W. Sturrock,
Crop Research Division, DSIR, Lincoln.

(from New Zealand Commercial Grower, August 1981)

In this article we are going to consider some current greenhouse modifications and the characteristics of new covering materials which will improve fuel efficiency.

One major advantage of clean glass is its good light transmission which remains essentially unchanged with age. In practice, however, dirt, surface etching, algal growth, and dulled sashbars all reduce available light. Some older types of glass become brittle with age, and caulking and sealing of individual panes are recurring maintenance problems. Apart from its poor insulating properties, glass is vulnerable to damage by wind, hail and vandalism.

In spite of the disadvantages, houses made of glass remain popular and efforts to improve their design and performance continue. Belgium-manufactured glass, in which a layer of metal oxide is bonded to the outer surface, has reduced heat loss through the glass by an average of 20% and light transmission by 12% in recent tests at Wageningn , Holland. Heat reduction is least when the oxide is moist, as with rain.

Dutch designers and British manufacturers recently collaborated to improve the Venlo type of glasshouse which is again becoming popular in Europe and some parts of the United States. A new double bay design gives more light and more space with, it is claimed, lower building and operating costs. Large panes (1.6m x 0.7m), 4mm thick, are used with butyl rubber sealing to reduce heat loss from the joints.

Double glazing with glass to improve insulation is prohibitively costly. Instead, ultraviolet (uv) stabilised film, bubble or aircap polyethylene are commonly used to line inner walls and ends of glass-houses at relatively small costs. To overcome some of the inevitable reduction in light transmission, particularly in winter, lightweight polyethylene/polypropylene netting has also been tried experimentally in England, with a reported fuel saving of 38%.

This material gives good transmission at low light levels and about 30% shading at high light intensities. Newer houses also employ less bulky materials, such as aluminium, that combine strength with lightweight, to increase the amount of light reaching the house interior.

All-Plastic Structures

Many different film and rigid plastics are in commercial use or under test for both single and double cladding. The better ones, allied with improved greenhouse design, substantially reduce heat transmission, improve the sealing, and because of their light weight reduce the structural support required. With some rigid plastics the substantial fuel economies may soon recover the greater initial capital cost.

The rate of heat transfer in watts per square metre per degree celsius allows comparison of the transmission coefficient (symbol U) of various materials. The lower the coefficient the better the insulation value. For 3mm horticultural glass/U is about 6.4, which is twice the coefficient of some double skin plastics.

Plastics are less durable than glass, although some new ones are expected to last at least 15 years.

Most have lower light transmission and the film types, again with one or two exceptions, deteriorate with age, reducing available light still more. Further adverse effects include increased condensation and higher humidity, a consequence of the improved sealing of the house.

Other disadvantages of plastic materials are their attraction for dirt and their fire hazard. Unlike glass, which normally acquires a negative charge which attracts some dirt (and can be cleaned by anionic detergents), plastics usually have a positive charge to which dust and dirt cling tenaciously, which adds to the loss of light. Cleaning requires cationic surfactants. Alternatively, overhead sprinklers may be required to keep plastic roofs clean in dry periods.

Growers therefore need to weigh up the favourable and unfavourable factors when considering a change from glass. Certainly in Europe and some other countries plastics - even the higher priced ones - are becoming serious competitors to glass, and the plastic greenhouse is becoming an economic alternative to the glasshouse. Flexible and rigid plastics must be considered separately.

FLEXIBLE PLASTICS

Single film tunnel houses

Polyethylene ("polythene") and its close relative polypropylene are readily made into inexpensive, low-density, tough, flexible films. Polythene is relatively more permeable to CO_2 and air than polypropylene. However, polythene is subject to photodegradation and stress cracking, because the blue to ultra-violet range of wavelengths in sunlight has enough energy to break the polymer bonds.

To reduce this damage, retardant compounds are incorporated which absorb the injurious radiation and convert it efficiently to heat. In Europe, current formulations extend the life of polythene film to three years.

A major disadvantage of single-film plastics is their ability to transmit heat of all thermal wavelengths, with valuesgreater than glass. Single-skin houses therefore cool very rapidly at night and may use 20% more fuel than glass to maintain even a low set temperature. Such houses are therefore best used for low-cost temporary or seasonal protection of crops requiring little or no heat. Even so the protection at night is reduced and there have been unacceptable delays in crop maturity. Where heat is given there is an additional source of heat loss when prolonged ventilation is used in an attempt to lower humidity. There have also been problems with crop diseases because of high humidity and physiological disorders, such as "glassiness" in winter lettuce, attributed to low tunnel temperatures.

Double-film tunnel houses

Although many of the problems of single-film coverings apply equally to double-skin structures, the insulation provided by twin layers produces substantial savings in fuel, and heating allows a wide range of commercial crops to be produced. The layers are kept apart by air at low pressure. Claimed reductions in heat loss range from 25% to about 40%, and are commonly 35-40% in the United States. In Australia a mean fuel saving of 37% was achieved over 35 experiments. In practice, some of these gains may be offset by the need for extra ventilation to give acceptable yields and to avoid disease problems. Polythene houses are also vulnerable to both mechanical damage and energy loss from wind.

Double polythene houses are popular in the United States, where it is considered worth sacrificing 15% of the light for the fuel economy achieved. In Europe, interest is less because of the belief that light transmission would be unacceptably low in winter. Although a second film reduces light by 8-10% when new and clean, experimental work in Ireland and England showed that the house's curved shape and lighter construction produced interior light levels not much different from commercial glasshouses. The Lee Valley Experimental Station in England has tried deflation of the films during the day to improve light transmission.

Production from double film houses can equal that from glasshouses, but in some climates delayed harvesting and reduced yields have been reported. Management must be geared to the different growing conditions within plastic structures. Work at Kinsealy, Ireland, has evolved a satisfactory humidity control regime for polythene tunnel houses. Excellent cropping results are reported from relatively expensive houses built in Finland. The main attractions of double-film structures are low capital expense and reduced operating costs, which compensate for the need to renew the polythene from time to time.

Polyester Film

Three years ago ICI England exhibited an experimental glasshouse clad in a new film of polyester of exceptional clarity (almost the equal of glass) and insulation value. This material and its method of operation are attracting enormous interest. The tough, stabilised film has an expected durability of 15 years in north-west Europe. It is only a little more expensive than glass, but a greenhouse constructed with this material requires only half the fuel of a comparable glasshouse.

The double layers are separated by low pressure air only at night; during the day a slight suction is applied drawing the inner surfaces - treated with dimethyl silicone - together so that they act optically almost as one layer.

The fuel savings in experiments are comparable with those from rigid double-walled acrylic and polycarbonate plastics (see below) but are obtained with less capital expenditure. Use of this material is still at the experimental stage. One problem has been loss of light because of condensation although this has recently been partly overcome by incorporating an anti-mist ingredient during manufacture of the film. A more intractable problem is the control of humidity, with levels up to 15% greater than in a glasshouse. The film may also have application as a liner to double glaze greenhouses and plastic tunnel houses.

RIGID PLASTICS

Early types of rigid plastic used as single cladding weathered badly and had poor durability. Improved versions have appeared, but in Europe at least they are likely to be superceded by new high performance plastics of double wall constructions.

Two, long used rigid plastics are PVC (polyvinyl chloride) and fibreglass. An interesting UV stabilised flexible PVC tunnel has recently been exhibited in England. It is self-venting and irrigating through flexible flaps which open and close under the pressure of water and rising warm air. Heat transmission however, is relatively high with PVC, especially in the corrugated forms with their increase in surface area (below).

Forms of fibreglass coated with the UV filter polyvinyl fluoride ("tedlar") have greatly improved durability. However, reports of tedlar-coated sheets delaminating have led US manufacturers to replace tedlar with a new coating guaranteed to resist yellowing and weathering for 15 years. Fibreglass is a mixture of glass-fibre and polyesters and performance is linked to the proportions used in manufacture.

Generally, however, fibreglass rates poorly in light transmission and has a heat transfer coefficient little different from glass. Claimed fuel savings seldom exceed 20% for plain sheets. Although flammable, it is cheaper than glass and is suitable for houses where maximum use of winter light is not critical for crop production, which preclude crops like tomatoes.

Corrugation imparts strengh to PVC and fibreglass sheets, but the increase in surface area (up to 18%) increases heat loss from the house.

The recent development of durable double-walled rigid plastics made from acrylic or polycarbonate is a significant step towards better fuel economy. They can save more fuel than double-film plastics, and last far longer. Their major disadvantage is their relatively high cost compared to glass and more traditional plastics, although this is being reduced.

TABLE 1: Prices (£/m^2) of completed and operational houses of glass, polycarbonate and acrylic, 1978-1981, in England. Figures in brackets are prices relative to glass.

	1978	1980	1981
Glass	13.5 (100)	19 (100)	22 (100)
Polycarbonate	16.6 (123)	23 (121)	26-27 (118-123)
Acrylic	23.4 (173)	29 (153)	30-31 (136-141)

In spite of their costs houses made of these materials are beginning to be used commercially in Europe. Fuel economies are consistently in the range 40-45%. The materials are light in weight and tough (polycarbonate is used to vandal-proof telephone boxes and street lamps), with good light transmission and low heat transfer coefficients.

TABLE 2:	3mm hort glass	Double skin acrylic	Double skin polycarbonate
Light transmission (% of glass)	100	89	85
U value ($W/m^2/^oC$)	6.42	3.2	3.5
Weight (kg/m^2)	7.83	5.0	1.2
Size of sheets (m)	up to 1.8 x 0.7	1.2 x 6.0	1.6 x 3.0

Acrylic is slightly difficult to fix and seal because of expansion and contraction problems and requires flexible sealing materials. Polycarbonates are easy to seal, can be readily cut and drilled, and can be curved to form tunnel houses. A new development has enabled continuous roof ventilation to be installed in polycarbonate structures.

It would be prudent for New Zealand growers to watch carefully further overseas developments in exploiting these twin-walled plastics and the new ICI double film. In England, it has been pointed out that the attainment of a 45% fuel saving by the glasshouse industry as a whole would usefully prolong the use of oil fuel and give more time to develop alternative energy sources.

SOIL AERATION AND TREES

by

David Beardsell,
Horticultural Research Institute,
Victorian Department of Agriculture.

(from Australian Parks and Recreation, November 1981)

Plant roots require oxygen to function properly, that is, take up water and nutrients from the soil (Rowe and Beardsell, 1973). Plants generally obtain most of the oxygen from the soil and only a few specialised swamp plants are able to transport oxygen down their stems from above ground. Most plants thus require well aerated and well drained soils to grow and develop. However, many soils in south-eastern Australia are poorly drained, and this, combined with high rainfall in winter and spring causes waterlogging, a major factor in reducing soil aeration.

A number of other factors can also cause poor soil aeration in streets and other sites in urban areas. Leaking gas mains can cause low levels of oxygen in the soil by displacing soil air and by causing a build up of oxygen-consuming micro-organisms which live on methane and other products of natural gas. The effect of leaking gas mains is much worse when the soil surface is covered with asphalt or concrete which eliminates gas exchange in and out of the soil. Sealed paving such as road surfaces can also trap gas so that even small leaks can lead to high levels of gas in the soil. Even where there are no gas leaks, concrete or asphalt paving can reduce the diffusion of oxygen into the soil.

Compaction of the soil from pedestrian and motor traffic can also cause a reduction in gas exchange and soil aeration in street sites. This is a serious problem where trees have been planted in roadways not provided with nature strips. Soil aeration is also reduced by building up the soil level around trees. Established plants are quickly killed by this practice.

In landfill areas, the breakdown of refuse can produce methane and carbon dioxide, causing low levels of oxygen in the soil (Flower and Leone, 1977). In some cases low soil oxygen levels in filled rubbish dumps may be associated with very high carbon dioxide levels without the presence of methane.

There is thus a diverse range of causes for poor soil aeration in urban areas. This article describes how to measure soil aeration and how to minimise the effects of low oxygen levels in soil.

Measurement of Soil Aeration

Relatively simple equipment is available for measurement of soil aeration. To sample soil below pavements, a drill is necessary. Using a sampling probe, oxygen levels can then be determined.

A heavy duty impact drill and portable generator are necessary for preparing sampling holes through asphalt, concrete and soil. The drill bits used are hardened steel 10mm in diameter. This produces an air tight hole for a sampling probe 7mm in diameter. Portable meters are used for measuring oxygen and combustible hydrocarbon gas. These are connected in series for convenience. The aspirator bulb attached to the outlet of the combustible hydrocarbon gas detector, draws in samples of the soil air for both instruments.

If the drill bit is found to be wet on removal from the soil it can be assumed that the soil is waterlogged and aeration is poor. If there is free water in the soil, oxygen and gas measurements cannot be taken, as water damages the instruments.

Waterlogged soils may arise from leaking water pipes, high water-tables or simply poor drainage. Since it is often difficult to locate the source of excess water, often the most effective method of overcoming waterlogging is to plant suitable species (Tables 1 and 2).

TABLE 1: Susceptibility of some native plants to waterlogging.

Sensitive - killed within 60 days	Intermediate	Resistant - all survived 180 days of waterlogging
Acacia iteaphylla	Eucalyptus calophylla	Eucalyptus crenulata
Pittosporum undulatum	Eucalyptus ficifolia	Eucalyptus sideroxylon
Eucalyptus pauciflora	Ecualyptus spathulata	Tristania laurina
Agonis flexuosa	Eucalyptus astringens	Callistemon salignus
Casuarina stricta	Eucalyptus leucoxylon	Callistemon citrinus
Hakea laurina	Eucalyptus lehmannii	Callistemon violaceous
	Eucalyptus kitsoniana	Callistemon phoeniceous
	Eucalyptus ovata	Callistemon pallidus
	Eucalyptus largiflorens	Melaleuca styphelioides
	Eucalyptus maculata	Melaleuca armillaris
	Angophora cordifolium	Melaleuca decussata
	Angophora costata	Melaleuca linariifolia
	Tristania conferta	Melaleuca ericifolia
	Casuarina torulosa	Grevillea robusta
	Casuarina littoralis	Hakea salicifolia
		Casuarina cunninghamiana

If the soil is not waterlogged its aeration can be determined by drawing a sample of the soil air into the oxygen meter. Well aerated soils have an oxygen content of 19-21 per cent, and oxygen values below this may indicate that the soil is polluted by gas from a leaking main, or on rare occasions by gas originating from other sources such as filled refuse dumps. The amount of combustible gas (mostly methane) can be measured using the gas detector. If gas is present in the soil then the local gas authority should be informed so that the gas main can be repaired or replaced. Surveys in Melbourne have shown that low oxygen levels persist in the soil for some time after gas leaks have been repaired. This is due to microbial activity breaking down products of the gas, which remain in the soil, and consuming large amounts of oxygen in the process. Research elsewhere (Hoeks, 1972) indicates that the minimum

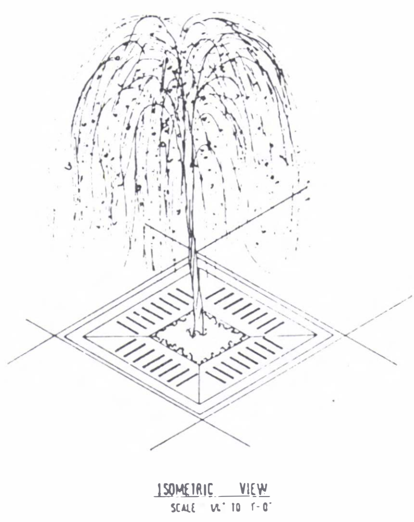


Figure 1. Decorative metal or concrete grates can be placed around a tree provided that they do not rest directly on the soil surface. (Courtesy of Ministry of National Development, Singapore).

oxygen level in the soil for normal root activity is 13 per cent. No planting should be carried out in soils with less than this level of oxygen.

Combatting Poor Soil Aeration

The best method of improving soil aeration in street sites is to minimise the amount of asphalt and concrete, which prevents gas exchange. Paving slabs surrounded by porous filing such as sand, soil or crushed rock is expensive but allows gas exchange and also water passage into the soil. To allow maximum gas exchange and water entry metal grates raised above the soil surface are recommended. Such metal grates, although very expensive, allow easy summer irrigation and prevent soil compaction as well as improving the appearance of pathways. An excellent set of guidelines for improving soil aeration have been formulated by the Parks and Recreation Division, Ministry of National Development, Singapore, and they have kindly allowed us to reproduce some of their recommendations here. Figures 1 and 2 show some acceptable designs for tree planting in paved areas. Note that the porous paving should extend to the expected eventual dip line of the mature tree.

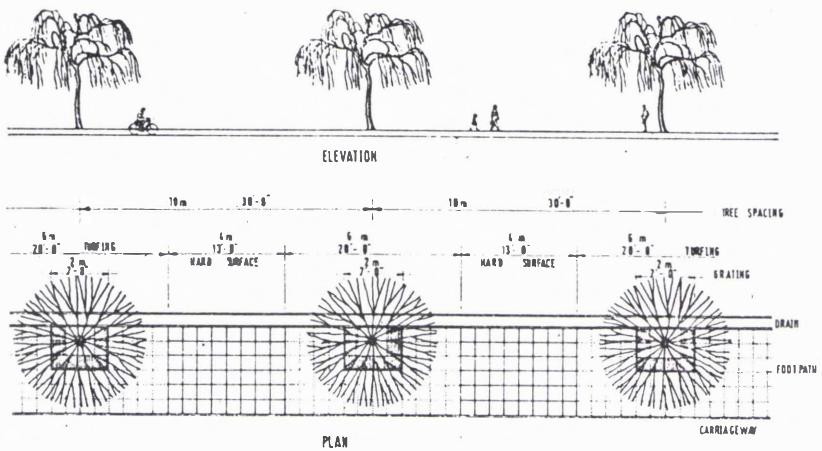


Figure 2. Trees in footpaths should be surrounded by a reasonable amount of the soil surface (2 m x 1 m) exposed to the air, and paving with porous filling which extends to the drip line of the tree.
(Courtesy of Ministry of National Development Singapore).

Another method of improving soil aeration is by changing the soil composition with porous materials such as pinebark or scoria, but this is very expensive and requires adequate drainage otherwise the treated planting area will collect water, causing waterlogging.

Plant Selection

Probably the least expensive and most successful method of combatting poor soil aeration is by using plants tolerant of poor aeration. A number of references (Gill, 1970; Rowe and Beardsell, 1973; Flower and Leone, 1977) have shown that different species of plants have widely different tolerances to poor soil aeration.

Table 1 shows the results of an experiment carried out at the Horticultural Research Institute where 40 species of native plants which are commonly used in street plantings were waterlogged in 10 litre buckets. The results show that there are great differences in the tolerances of different species to waterlogging, and that the differences are related to the natural habitats of the plants. Species such as *Melaleuca styphelioides, M. linariifolia, M. armillaris* and *M. ericifolia* which live on the margins of swamps, and species such as *Eucalyptus crenulata, Casuarina cunninghamiana, Callistemon pallidus, C. saligna* and *Tristania laurina* which come from river bank habitats, are resistant to waterlogging. Species from well drained habitats such as *Acacia iteaphylla, Agonis flexuosa, Casuarina stricta* and *Hakea laurina* are intolerant of waterlogging. A more extensive list of plants which are considered as being tolerant of poor aeration is shown in Table 2.

TABLE 2: Plants tolerant to poor soil aeration.

Acer saccharinum	Melaleuca decussata
Alnus betulifolia	Melaleuca ericifolia
Alnus glutinosa	Melaleuca halmaturorum
Callistemon citrinus	Melaleuca incana
Callistemon macropunctatus	Melaleuca leucadendron
Callistemon paludosus	Melaleuca linariifolia
Callistemon salignus	Melaleuca quinquenervia
Callistemon viminalis	Melaleuca squamea
Callistemon viridiflorus	Melaleuca squarrosa
Casuarina cunninghamiana	Melaleuca styphelioides
Casuarina paludosa	Picea abies
Fraxinus pennsylvanica	Pinus sylvestris
Kunzea ambigua	Populus yunnanensis
Leptospermum lanigerum	Pyrus calleryana
Melaleuca armillaris	Quercus palustris
Melaleuca bracteata	Taxodium distichum
Melaleuca cuticularis	Tristania laurina
	Viminaria juncea

These plants should be used in sites where poor soil aeration or waterlogging are encountered. However, not even these species can be expected to thrive in soils which contain stagnant water or high levels of natural gas.

A two-pronged approach is probably the best solution to problem areas with poor soil aeration. Use of porous paving, improved drainage and rectification of gas leaks are physical modifications to improve the root environment. Choice of suitable species with high ornamental value should produce a landscape geared to survival.

THE USE OF SAWDUST AS A GROWING MEDIUM

by

Murray Richards, Director of the New Zealand Nursery Research Centre.

(from Commercial Horticulture July, September 1981)

For many years, in fact virtually since the introduction of soil-less growing media into New Zealand, nurserymen have been interested in the possible use of sawdust as a growing medium. This interest was fuelled by Dr Ken Baker, in U.C. Manual, in which he stated that sawdust could be used as a constituent of the 'U.C. mixes'. He was, of course, referring to the redwood sawdust which is a very different product to the New Zealand sawdust, a point which we need to keep in mind.

The current interest in the use of sawdust in New Zealand stems from two main areas. We have a lot of it, and it is relatively low priced. There is still a belief that, by some means or another, sawdust can be converted into a good growing medium. The New Zealand Nursery Research Centre receives a number of requests each year for ways to find an appropriate formula.

The Needs of the Plant

It is not particularly easy to convert sawdust into a good growing medium. The fact that plants can be grown in sawdust often prevents people realising that they can grow superior plants in other media. The purpose of this article is to advance some ideas on why this is so, and to show some of the problems associated with trying to make a good growing medium from sawdust.

The amount of growth a plant will make is governed first by its genetic make up - the inherent factors arising from its 'breeding'. For a given plant the question of whether or not it reaches its potential is governed by a large number of factors which constitute the 'environment' around the plant. In the above ground part of the plant these include light and carbon dioxide for photosynthesis, temperature, and water supply to the leaves. Thus for a given above ground environment we have a potential growth rate for that plant.

Whether or not the plant reaches that potential is further influenced by factors which operate below ground. The water availability is of vital importance, and we can control this by supplying water to the roots via the watering medium. However, the dominant factor is the amount of nutrient available to the plant. To secure something approaching the potential growth for that plant we must supply all of the nutrients which the plant can use. Failure to do this will result in a reduced growth rate, without the plant necessarily showing any signs of nutrient deficiency.

We are so accustomed to thinking of nutrient deficiency in terms of gross deficiency, when the plant shows well defined symptoms of that deficiency, that we are inclined to believe that if these are not visible the plant has adequate nutrient supplies. We must be more aware of the fact that sub optimum nutrient levels can reduce growth without obvious deficiency symptoms. Indeed, we may find that nutrient deficiency of this sort only occurs when we compare the affected plant with those given all the nutrients they can use.

This is well illustrated by the results of studies, at the New Zealand Nursery Research Centre, on producing plants in the same medium but in containers of different volumes (NRC Annual Report, 1980). Plants in the smaller containers made less growth, because they had less nutrient per plant, but they did not show any symptoms of nutrient deficiency. When the growing medium was adjusted so as to give the same nutrient supply per plant, irrespective of container size, growth was comparable in all plants.

At first glance it might seem that the answer to this problem is simple - increase the amount of nutrients per plant - but the truth is that it is not as simple a problem as it appears. As we increase the amount of nutrients in the medium we increase the amount of soluble material in the media solution, hence we increase its salinity. If this process is carried too far, of course, we create typical salinity, or soluble salt damage. However, before that stage is reached the increasing salinity will have had more insidious effects. It starts by reducing water uptake by the plant, thus restricting growth of the tops, and progresses to the stage where damage occurs to the fine 'feeding' roots thereby reducing nutrient uptake. The nutritional problem then becomes one of a balance between providing all the nutrients which the plant can use, without creating a salinity situation in which the osmotic pressure of the root-zone solution restricts growth.

The Salinity Problem

The problem of salinity or osmotic pressure is made up of two parts. The obvious one is the amount of dissolved material (nutrients) and the less obvious one is the amount of water in which that soluble material is dissolved. Increasing the amount of water is the equivalent of decreasing the amount of nutrients. Hence the more water held in the growing medium, the more fertiliser which can be added without reaching harmful salinity levels. In order to use high fertiliser levels it is essential to have a growing medium with a high water holding capacity. In this the freely available water appears to be especially important.

Besides the capacity to hold freely available water, another factor of water supply is important, namely the maintenance of a continuous supply of freely available water in the medium. If a growing medium is allowed to partially dry out, the concentration of soluble salts will be increased, and growth restrictions and plant damage may occur without the plant showing visible signs of injury.

To use the high fertiliser levels which the plant can utilise may well mean the need for much more frequent watering than nurserymen are accustomed to using. This of course leads to fears of overwatering.

The Aeration Problem

The old fear of overwatering is in fact misplaced. When water is applied to a growing medium it may temporarily displace most of the air in that medium, giving rise to temporarily 'waterlogged' conditions. The length of time in which this condition persists depends upon the drainage rate of the medium. The problem then is not excess water but lack of air in the root-zone, which in turn causes root-death.

If we accept the dictum that we need to keep the growing medium fully charged with water, to avoid salinity problems, the only safe way to do this is to use a growing medium which is inherently well aerated. If this is done the growing medium can be maintained at container capacity, i.e. holding all the water it can against drainage, without any fear of overwatering.

What of Sawdust?

The problems outlined are presented to highlight the real problem of sawdust as a growing medium in New Zealand. Generally sawdust in this country is *Pinus radiata*, and consists of a series of more or less cubical blocks, with a 'coarse' particle size. When the sawdust is fresh it has a very low content of freely available water, of the order of 4 per cent of the volume, although the air-filled pore space (aeration) is relatively high - 42 per cent volume. In this condition the sawdust will easily provide a root zone solution with high osmotic pressure, and fertiliser levels which might be acceptable in other media frequently become toxic in sawdust media. This has been demonstrated by trials at N.Z.N.R.C. on a number of occasions.

Although a fresh sawdust growing medium is inherently well aerated, it does not always stay that way. Under heavy watering the sawdust particles show some tendency towards realignment with closer packing of the particles and a fall off in aeration capacity, although this often does not cause serious problems. However, if decomposition of the sawdust particles commences they tend to change their characteristics, water holding capacity increases considerably, but aeration may decrease very seriously and appreciable root damage can occur. Large scale decomposition of the sawdust is therefore undesirable.

It is commonly held that a serious cause of growth reduction in sawdust growing media is the locking up of nitrogen by the micro-organisms responsible for the breakdown of the sawdust, and that the problem can be overcome by incorporating extra nutrients into the medium. At best this philosophy is mistaken, at worst, it can be positively dangerous! The rate of breakdown of sawdust in a soil-less growing medium is much slower than is commonly anticipated. If this were not so more plants growing in sawdust would be suffering seriously from waterlogged root zones and root-death.

We have already said that the problem of growing plants in sawdust is the problem of using enough nutrients without creating osmotic (or salinity) stress. Adding additional nutrients merely compounds this problem, with what could be disastrous results, unless the level of fertiliser previously being used was extremely low.

Fine Sand Additives

It is possible to improve sawdust by adding fine sand, or some similar material, in order to improve the water holding capacity. The fine sand will tend to move into the comparatively large pores in the sawdust and, because the sand particles are very small, increase the water holding capacity, at the expense of some loss of aeration capacity. Theoretically at least, it should be possible to modify sawdust in this way until its water holding capacity is high enough to give very good results.

For short term crops, under very good management, this may be an acceptable practise, but we need to recognise that troubles can occur. As the sawdust starts to decompose and lose its high aeration capacity, the sawdust sand mix may become under-aerated, and root-rot problems can arise. This is a danger especially with long term crops and with crops requiring a high level of aeration in the medium.

Problems may also arise in mixing sawdust and fine sand. The two very different materials will tend to separate, creating uneven media with resultant growth problems. Similarly, watering treatments can wash the sand out of the medium, or create conditions in which the sawdust floats to the surface creating two distinct zones of media.

Use of Hydrogels

Hydrogels are materials which absorb large quantities of water and assume the form of a soft jelly. Plant roots can grow into the gels and absorb water from them, thus a mix of sawdust and hydrogel seems to be able to supply the plant with comparatively large quantities of moisture.

Tests at N.R.C. have shown that such mixtures can grow plants nearly as well as other materials such as peat or bark mixtures. There are a number of hydrogel materials available, our tests indicate that their usefulness may be directly related to their ability to absorb water.

Hydrogels may offer a very real chance to produce a good quality medium from sawdust but at the moment there are difficulties, the biggest of which is price. The main material tested so far would cost the equivalent of $27 per cubic metre of mix. At this price peat could be a much better bet.

Use Larger Containers

The main limiting factor with sawdust is its low water holding capacity. This can be overcome to some extent by using a large container thus increasing the water availability on a per plant basis. For example, if we assume that a sample of sawdust holds half as much water as a good sample of peat, then if we double the size of the container we would give each plant the same amount of water as would have been available from the smaller container of peat.

If we had halved the quantity of fertiliser per cubic metre of sawdust, we would also provide as much fertiliser per plant as we would have done in the peat mixture.

This approach has been used in some cases but because of larger containers, more space required higher transportation charges, etc., it usually tends to be self defeating in economic terms.

Possible Alternatives

All of the solutions suggested above have serious drawbacks, but we should continue to seek other possible solutions to the problem of making an acceptable growing medium from sawdust.

One possible development is to stabilise sawdust against breakdown. If we could do this it may well become possible to find some small-particle-size amendment which would add to the water holding capacity of the sawdust.

If we did not have to consider decomposition of the sawdust as a hazard of such mixtures it might well become a practical proposition. Such stabilising techniques are already known overseas, and N.R.C. will be looking in future to see if these have value under N.Z. conditions.

A Word of Warning

The Nursery Research Centre will be continuing to seek out possible ways and means of making sawdust into a reasonable growing medium. However, nurserymen should be aware that the days of low priced sawdust may be numbered. There are alternative uses for sawdust, including its use as fuel at the mill site, or in industrial uses such as the production of alternative fuels, e.g. alcohols. As such uses become further developed, sawdust will have a higher price in most areas.

If this price rises too high, the additional cost of amending sawdust to make it acceptable as a growing medium may make it into a high price material. Such problems have already developed in some overseas countries.

CULTIVATING NEW HABITS

by

T.I. Cox,
Weed Scientist, Horticultural Research Centre, Levin.

(from New Zealand Commercial Grower November 1981)

In previous eras soil cultivation depended on man and animal power - sources of energy which were clearly exhaustible and therefore husbanded carefully. By contrast, in this century cropping systems have developed with readily-available mechanical horse power. Tractors have continued to evolve with more muscle in every new model.

It is hardly surprising that thorough working of the land has become a routine prerequisite to sowing most crops and growers have become accustomed to "stirring their soils like Christmas Puddings".

In New Zealand we have not been served the catastrophic warnings that farmers of the Great Plains of USA and Canada received in the 1930s when excessive cultivation led to massive soil erosion and stubble mulching was developed to stop the top soil blowing away. On the whole, pressures for intensive land use have not been very heavy except in particular market gardening districts where gradual deterioration of soil structure has been the main result of over cultivating.

Although this is not as dramatic or final as good top soil blown or washed away, many seasoned growers will agree that their land has become increasingly difficult to work with each year a bit harder to create a good tilth.

Often this is obscured and, for a time, overcome as old tractors are replaced by more powerful new ones and discs and harrows are superceded by power-driven rotary cultivators.

The need to maintain control of weeds has given good reason for many cultivation operations but nowadays herbicides provide another option. With greater choice of method, weed control has ceased to be a major reason for cultivation and this allows us to reconsider and question the purpose of traditional tillage.

At Levin HRC evidence of long-term effects of soil cultivation on weed populations has been accumulating over the past 15 years. About 30 species are recorded regularly in vegetable seedbeds and the total viable weed seed population has been estimated at 250 million per hectare.

About one tenth of these would be expected to germinate each year which, in a crop of medium density like sweetcorn, lettuce or beans means that every single plant may be outnumbered by 50 or 100 weed seedlings.

It is well known that weed germination is strongly influenced by moisture, light and temperature conditions and is normally stimulated by shallow cultivation. This knowledge, supported by continuing experiments, has been used to advantage to manipulate weed germination in seedbeds. The classical stale seedbed technique encourages a "flush" of germination before removing seedlings with a desiccant spray. Selective herbicides work most efficiently when the target weed population has been encouraged to emerge quickly and evenly in the seedbed.

Another approach is to minimise the weed problem, or by-pass it altogether, by not providing good conditions for germination, that is, by leaving the soil as far as possible undisturbed. Although soil preservation is a major reason for this approach its adoption relies absolutely on effective vegetation management. It has been attempted with varying degrees of success in many parts of the world under a variety of titles: "minimum tillage", "zero-till", "direct-drilling", "chemical ploughing" and now "conservation tillage". In New Zealand the technique has recently received fresh impetus, after earlier work with paraquat and other herbicides, since the introduction of glyphosate.

In no-cultivation systems at Levin several horticultural crops have grown well accompanied by a general improvement in soil condition, reduction in annual weeds and increase in earth-worm populations. Problems still occur with patches of perennial weeds, certain pests (especially slugs) and difficulties with fertiliser application techniques.

Best results have been obtained with crops of sweetcorn, broad beans, peas, pumpkins and gherkins and, given sufficient reason to seek a change from conventional tillage habits, a grower can now obtain guidance from existing research experience to take exploratory steps to reduce unnecessary cultivation.

Less radical changes in tillage practice can also be considered as a means of overcoming some difficult weed problems. For example, no selective herbicide is fully effective in direct-sown tomatoes and the closely related black nightshade is a particular problem.

Normally the seedbed is made just before sowing and the crop and weed seeds emerge together. Levin work has shown, however, that if tomato beds can be prepared well ahead of sowing, in the winter or even the previous autumn, and the crop sown into the stale seedbed, then weed germination is minimised and more easily dealt with in the time available before tomato emergence.

This technique has been taken a stage further in experiments by sowing a grass or cereal cover on the prepared beds. The cover crop is desiccated and tomatoes sown with a specially designed minimum cultivation drill.

Bird protection provided by the dead foliage could be an extra bonus. While some success has been achieved with this approach there are still problems with sowing equipment and in practice it would inevitably require changes in cropping systems to make land available for preparation ahead of time.

Producing crops to a pre-planned schedule is an aim of efficient food processing operations and all growers are plagued by the uncertainties of the weather. One of the advantages of reduced cultivation systems is less dependance on soil moisture at the due sowing date.

In wet weather undisturbed soils are firmer than cultivated seedbeds with a greater ability to carry tractors without causing damage. It may be possible to sow early peas, for example, in a minimum tillage system when the land would be impossible to work in wet spring weather and so maintain target sowing dates. Similar advantage can be gained at maturity when the soil has to support heavy harvesting equipment.

There are many reasons for change in cropping systems. Usually the most urgent and obvious ones are simply economic . Ever-rising costs of fuel may be sufficient stimulus for a grower to test a reduced cultivation technique.

Whether the motivation comes from immediate operational costs, more predictable sowing and harvesting schedules, or longer-term conservation concerns, the grower now has considerable freedom of choice before deciding how much to cultivate his soil.

TREE PRUNING - WITH A CHEMICAL

(from The Orchardist of New Zealand, October 1981)

Time-consuming hand pruning of fruit trees may soon be a thing of the past. Trials with a new experimental chemical have given the promise of chemical pruning. The chemical, known only as code number PP333, has been tested over the past three years by Britain's East Malling Research Station. The station says in its annual report that PP333 has proved very effective in checking shoot growth without apparently reducing the size of the fruit or stimulating regrowth in the following years.

The East Malling agricultural scientists are clearly optimistic about the chemical for, while warning that much more work needs to be done on it, they say the possibility of controlling tree growth without pruning has major implications for the fruit industry.

Over the past few years many chemicals have been tested as retardants for controlling growth on cropping trees. Most were discarded because they were ineffective or poisonous.

By contrast, PP333 gives very good control of shoot growth without any apparent damage to trees or fruits. It thus opens up the possibility of improving productivity by allowing trees to be planted closer and eliminating the cost and time involved in hand pruning.

Both apple and cherry trees have responded well to being sprayed with PP333. A pronounced carry-over effect was detected in years following treatment. For instance, four-year-old apple trees treated in June 1978 had negligible shoot growth in 1979 and 1980. In another case the vigour of growth presented serious problems when the closest spacings were used between trees. PP333, however, checked the shoot growth without affecting photosynthesis.

No details of the chemical formulation have yet been revealed but the East Malling report says it causes the shoot apex rapidly to form a terminal resting bud. Apple seedlings treated with the retardant resumed normal growth when treated with other chemicals, suggesting that PP333 may limit shoot growth by interacting against a hormone within the tree.

The researchers are continuing their test programme with an investigation of the effects on several physiological processes involved.

DISTRICT COUNCIL SECRETARIES

AUCKLAND :
Mrs. S. Davison,
7 Wapiti Avenue,
AUCKLAND 3.

BAY OF PLENTY :
Mrs. D.A. Hardwick, AHRIH,
Minden Road,
Te Puna, TAURANGA

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

MANAWATU :
Dr. E.O. Campbell, FRIH,
26 Frederick Street,
PALMERSTON NORTH

NORTH TARANAKI :
Mrs. Marie Ward,
52 Lyn Street,
NEW PLYMOUTH

OTAGO :
Mr. R.M. Scott,
P.O. Box 5045,
DUNEDIN

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

SOUTHLAND :
Mr. G.A.R. Petrie, AHRIH,
64B Clifton Street,
INVERCARGILL

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

WAIKATO :
C/- Mr. F. Dorofaeff,
Ruakura Ag. Research Centre,
Private Bag,
HAMILTON

WELLINGTON :
Mrs. Diane Menzies, FRIH
7 Huia Road, Days Bay,
Eastbourne, WELLINGTON

WHANGAREI :
Mrs. M. Kennedy, AHRIH,
14a Takahe Street,
Tikipunga, WHANGAREI

RNZIH Notable & Historic Trees Committee - P.O. Box 11-379, WELLINGTON

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

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

Annual Subscription rates : (Subscription year ends 31 Dec.)

General Members and Fellows $10.00
Husband/Wife Joint Membership $13.50
Small non-commercial societies $10.00
Firms, companies (commercial) $10.00
National non-commercial societies $20.00
National commercial organisations $40.00

Subscriptions should be sent to : the Secretary, RNZIH, P.O. Box 12, Lincoln College, Canterbury

---

Get in touch with your District Secretary and become involved with local RNZIH affairs.