THE NEW ZEALAND beekeeper

MARCH 1980

THE NEW ZEALAND BEEKEEPER

NZ Post Office Registered Publication.

March 1980
Vol. 41, No. 1

Publishers
The N.Z. Beekeeper is published by the Agricultural Press Co. Ltd, Box 176, Carterton, on behalf of the National Beekeepers' Association of N.Z. (Inc.), Box 4048, Wellington, in the first week of March, June September and December each year.

Editorial: Trevor Walton
Advertising: Alison Woolley
Address:
Box 594, Masterton, phone 81039
Deadlines:
Second Monday of the month preceding publication.

Circulation
All enquiries relating to the distribution of the N.Z. Beekeeper should be directed to Mrs James, National Beekeepers' Association, Box 4048, Wellington.
Printer: MGV Ltd, Hutt Road, Kaiwharawhara, Wellington.

Index

March 18 meeting crucial

BY THE time this issue reaches your hands, HMA suppliers in both islands will have probably resolved on the formation of North and South Island honey marketing co-operatives to replace the HMA.

The writing has been on the wall for the authority for some time, but the decisions of its suppliers which will undoubtedly be the ones to put a time limit on its operations.

For those involved with supplying the authority in past years, the formation of a co-operative may seem to end the matter, but nothing could be further from the truth. Co-operatives are nothing more than private exporting companies with tax advantages and capital gain disadvantages. (In fact, in a time of high inflation, producers may well be better off forming private packing firms rather than co-ops.)

Their power in the market place is no more and no less than that of any other producer-packer, and like competing private packers, they will have to foot it with hard-deal supermarket buyers and complex export logistics.

One of the major matters which should be considered at the March 18 meeting of industry interests in Wellington, should be the future role of industry organisations in marketing. With the HMA gone, there will be a need for an export pricing authority to set export minimums and in all probability, the establishment of a market information service to ensure that weak-selling small packers do not undercut the market.

There's no doubt that there will be a flurry of political activity surrounding the meeting, because the livelihood of most beekeepers is directly or indirectly tied up with the HMA.

The formation of large marketing co-operatives may be seen as a threat by small private packers. On the other hand, the larger private packers will see a bigger threat from small co-ops with staff who maybe marketing novices.

From all sides there is a need for trust and a recognition that people are apt to become emotional when their livelihoods are at stake. Also, those people with grand professionally-prepared plans should remember that the plans will be only as good as those who implement them. That means marketing men. And good marketing men are both expensive and thin on the ground.

NATIONAL BEEKEEPERS' ASSOCIATION

OF N.Z. INCORPORATED

President:
P. Marshall, 1 Bracken St., Napier
Phone 58-348 (home)
58-137 (business).

Vice-President:
Michael Stuckey, P.O. Box 35233, Browns Bay, Auckland.
Phone 4781-284 (home)
4781-133 (business).

Executive:
S.J. Lyttle, No.2 R.D., Geraldine. Phone 1189.

M.D. Cloake,
Fairview R.D., Timaru.

Ian Berry, P.O. Box 16, Havelock North. Phone 775-400 and 777-300 (business) and 778-772 (home).

Tony Clissold,
No. 5 R.D., Gore
Phone 866, Willowbank.

General Secretary:
Graham Beard, Level 14
Pastoral House, P.O. Box 4048, Wellington. Phone 721-541.

Hon. Librarian:
M.J. Heineman, R.D.2, Milton, Otago. Phone 4613 (home)
4614 (business).

BRANCHES

FAR NORTH
President: Mr W.G. Macpherson, R.D.3, Kaitaia.
Secretary: Mrs W. Macpherson, R.D.3, Kaitaia.

NORTHLAND
President: Mr T.C. Gavin, R.D.2, Whangarei.
Secretary: Mr G. Richards, 27 Meadowpark Crescent, Whangarei.

WAIKATO
President: Mr R. Robinson, Box 4, Waihou. Secretary: Mr T. Lorimer, 353 Cobham Drive, Hamilton.

BAY OF PLENTY
President: Mr A.B. Edwards, R.D.3, Tauranga. Secretary: Mr R. Hale, 43 Church St, Tauranga.

HAWKES BAY
President: Mr I. Berry, c/- Arataki Honey Ltd, P.O. Box 16, Havelock North. Secretary: Mr W. Watts, 112a Avondale Road, Taradale, Napier.

CENTRAL/SOUTH HAWKES BAY
President: Mr D.L. Ward, Guy Street, Dannevirke. Secretary: Mr J. Ward, Sydney Tce, Takapau.

OTAGO
President: Mr W. Ross, 2 R.D., Mosgiel, Secretary: Mr N. Walker, 2 R.D., Milton.

SOUTH WESTERN DISTRICTS
President: Mr T.D. Rowe, P.O. Box 18, Eltham. Secretary: Mr P. Bennett, 4 Graham Street, Eltham.

NELSON
President: Mr R. Ellis, 31c Doran St, Richmond. Secretary: Mr B. Sellars, 22 Shelley Crescent, Stoke.

WEST COAST
President: Mr A. Braid, Franz Joseph Glacier. Secretary: Mr J.R. Bushby, Poerua, R.D. Kumara.

CANTERBURY
President: Mr A. Hill, 3 Queen Street, Rangiora. Secretary: Mr A.J. Scott, 120 Main South Road, Christchurch.

SOUTH CANTERBURY
President: Mr S.F. Robins, Manse Rd., Pleasant Point. Secretary: Mr N. Trezise, 69 College Road, Timaru.

NORTH OTAGO
President: Mr R.M. McCallum, Herbert, 8 O.R.D., Oamaru. Secretary: Mr G.E. Winslade, 1 H.R.D., Oamaru.

SOUTHLAND
President: Mr A. Ward, 10 Beattie Street, Gore.
Secretary: Mr M.W. Ballantyne, Woodlands.

N.Z. BEEKEEPER ADVERTISING RATES

Commercial Rates (per insertion)

Full page $160 (4 insertions $120), Half page $90 (4 insertions $75), Quarter page $45 (4 insertions $40), 1/8 page $25. Special locations $30 extra. Colour $60 extra. Production charges will be made for all new advertisements where special production work is needed. Classifieds $5 a col./cm.

Beekeeper rates

Advertising at these rates is available to registered beekeepers advertising products or services directly relating to their beekeeping enterprise only. In cases where the appropriate rate is in doubt, the editor's decision will be final.

Half page $65, Quarter page $35, 1/8 page $20, $3 /col.cm. Production charges will be made for single insertions of a minimum of $5. (This does not apply to classified advertisements.) No deduction for contracts. Colour extra.

Subscriptions

The NZ Beekeeper is distributed free to all beekeepers owning more than 49 hives who, after paying their compulsory hive levy, automatically become members of the National Beekeepers' Association of New Zealand (Inc).

Beekeepers owning less than 50 hives, will pay an annual subscription of $9.00 which includes the cost of a subscription of the NZ Beekeeper.

Yet another fire

by John Smith, Christchurch

BY THE TIME I arrived, it was the cleaning up stage, and Leon stood among the blackened ruins with a bright smile saying, "Well it could be worse John, it could have been your house". Well while I must agree with that view, to see yet one more honey house a victim of a stuck hot room thermostat, makes the time right to look at the subject of hot rooms and fires.

So as an expert on electricity and fires having served for a very short time as a J.E.M.2. (Junior Electrician Mate Second Class) in the Royal Navy, and was the boy who lit the fire that burned down the village hall, I have a few ideas.

First it appears, when you place an old type "make and break" thermostat in a honey laden atmosphere, its only a matter of time before the points will become gummed with honey and stick. If you don't believe that honey sugar crystals are everywhere in the honey shed, get up and lick the hot room ceiling.

So any cheap household thermostat mounted on the hot room wall should be thrown away *today*. In the case of the dearer tube type thermostats, anything over five years should be at least returned to the suppliers for cleaning and checking, but really you should think about their replacement with one of the new electronic breed.

For the transistor "chip" industry has been doing some funny things with thermostats, no longer does the power switch on and the heaters glow red hot until switched off again. Now in a little black box by your switchboard, there is a little chip "thinking" for you; changing the amount of power 50 times a second, to the hot room heaters, keeping the heating elements only a few degrees above the surrounding air. No more glowing red hot wires and no more stuck up points of a thermostat, keeping them hot until you melt your wax in the honey frames or burn down your honey house.

Now I'm not claiming that the new breed of thermostats are cheap, they range from $100 upwards. The price you pay will depend on if you want warning bells to ring, or the local fire service called, or even your family in outer Mongolia telephoned – it can all be done at a price.

The one I like costs just about one drum of honey, does nearly all the above and is as near fool (sorry beekeeper) proof as you can get. If all else fails it shuts off all the power to the honey shed and sulks until the right man does the right things to the system.

Can you afford not to have one in your honey hot room?

To end on a happier note, my friend of the first paragraph, has nearly rebuilt. Havill's Mead of Rangiora will soon be in production again, and Leon, that bottle we found in the ruins was delicious, smokey but delicious, maybe there is a market for smokey mead!

N.B.A. Dominion Conference and M.A.F. Seminar at Tauranga July 22,23,24, 1980

Programme

Tues July 22	M.A.F. Seminar at Willow Park Evening 'Get together' Informal Social.
Wed July 23	N.B.A. Conference at Willow Park Exciting Coach tour for those not attending Conference.
Thurs July 24	N.B.A. Conference Evening Social and Dance at Erinlea Lounge.

Accomodation

There may be heavy motel bookings in the Tauranga region at the time of the conference. Your early booking of accomodation at the following suggested motels would be advisable.

Willow Park	P.O. Box 764, Tauranga. Tel 89-119. Single $30.00, Dble $35.00, Extra Adults $5.00.
Domain Motel	(200 yards) Cameron Rd, Tauranga. Tel 89-479. Single $18.00 Dble $24.00, Extra Adults $7.00.
Roselands Motel	(50 yards) 21 Brown St, Tauranga. Tel 82-294. Dble $26.00, Extra Adults $6.00.
Tauranga Motel	(1 km) 1 Second Avenue, Tauranga. Tel 87-079. Single $20.00 Extra Adults $6.00.

Registrations

Registration fees and further details of MAF Seminar and N.B.A. Conference will be advised in June issue of the Beekeeper. Enquiries to B.O.P. Branch, Conference Secretary, Bruce Stanley, Fosters Road, R.D.1, Whakatane. Tel. 35-D Taneatua.

NZ Beekeepers needed in Africa

THE INTERNATIONAL Bee Research Association has established a branch of its library for Africa at the Interafrican Bureau for Animal Resources in Nairobi, Kenya. The Ministry of Overseas Development in London funded the binding of journals for this library. IBRA has been unable to obtain the following issues of "The New Zealand Beekeeper", and the National Beekeepers Association has no copies left.

1968: all issues; 1969: all issues; 1970: all issues; 1971: all issues; 1972: all issues, except November; 1973: all issues; 1974: all issues; 1975: all issues; 1976: March, June; 1977: March, June; 1978: March, June.

If you can provide any of the above issues, please write to IBRA, Hill House, Gerrards Cross, Bucks SL9 ONR, England, stating the issues you can offer and at what price?

New bee research reprints

IBRA HAS published two new Reprints, from 1979 "Bee World". The first deals with chemical poisoning of honey bees (M100) and the second with the behaviour of the honey bee colony in winter (M101).

Since Dr Johansen's 1966 "Digest on bee poisoning" in "Bee World", much work has been done in many countries to reduce the hazards of insecticides to bees, and Reprint M100 describes some of the successes of this research. It also explains extra hazards bees now face from some new pesticide formulations.

In the USA, where Dr Johansen works, large-scale methods of agriculture, with advanced mechanisation, amplify some of the problems, but the findings he reports apply world-wide. They will be of special value in developing countries, where availability of materials has outstripped knowledge about their proper use, and a great many bees are killed unnecessarily by insecticides, to the detriment of crop pollination.

Reprint M101 sets out the principles for winter survival of the honeybee colony, including the temperature control mechanisms involved and the ecology of the winter cluster. Subjects include water content and water recyling in the individual bees, water recycling within the cluster, enzyme action and physiological modifications, and movements of the cluster of bees in the hive. It provides the biological basis of successful and unsuccessful wintering of honeybees.

The Reprints are available direct from IBRA, Hill House, Gerrards Cross, Bucks SL9 ONR, England. The price of each reprint is 75p or $2.00, post free.

BEEKEEPERS TECHNICAL LIBRARY

Box 112, Milton, Otago

A very pleasant surprise arrived in the mail one day. Three books donated by John McFadzien of Havelock North. For those who don't know him John is a life member of our association, he rendered outstanding service to the industry as editor of the Beekeeper for many years and was always ready to help his fellow beekeepers where possible. A few months ago he retired from his job with the PSSA at Havelock North. John, we wish you the very best in your retirement and once again many thanks for your gifts to the library.

BEES ARE MY BUSINESS, Harry J. Whitcombe & J.S. Douglas. The story of beekeeping and a beekeeper and his family. From a small start to a large undertaking. Through all the ups and downs. A lot of information of practical value woven into a heart warming human story. Good reading.

BEES, FLOWERS and FRUIT, Herbert Mace. If you want to know more about flowers, different ways of their fertilisation, insects and the superiority of the honey bee as pollinator this book gives it to you in a clear and readable manner. Based on the British flora.

ANATOMY AND DISSECTION OF THE HONEY BEE, H.A. Dade. We already have this in the library. But this extra copy is very welcome as the book is often out on loan to serious students of beekeeping. It is one of those classics we cannot do without.

Then I received another parcel in the mail from the editor of this Journal. Thanks.

NEW APITHERAPY RESEARCH. 2nd Internat. Symposium on Apitherapy, Bucharest 1976. Besides a lot of research results in connection with the treatment of forms of ailments with bee venom, pollen, propolis etc., which really is very interesting, I see a good drawing of a pollen trap. The book shows very clearly the importance of hive products other than honey.

GENETICS, SELECTION AND REPRODUCTION OF THE HONEY BEE. Also an Apimonda publication. Internat. symp. on bee biology Moscow 1976. Rather heavy reading, more for a reference book for those who make it their job to select and breed better stock for our queen breeders. (And there is room for improvement!) It just goes too far for the day to day beeman.

BIENEN MUSEUM UND GESCHICHTE DER BIENENZUCHT (Bee Museum and History of Beekeeping). 1977 symposium, Apimondia publication. Interesting if you can read German. Many very intriguing photos, showing types of hives, equipment, carvings, coins with bees and cute drawings.

MIEL: ASPECTS TECHNOLOGIQUES. (Honey: Technological Aspects). French this time, Apimondia 1977. Deals with basic testing and grading, also safeguards against adulteration of a natural product.

DEVELOPMENT OF WORLD APICULTURAL TRADE. (Apimondia 1977). Interesting as it shows figures of world and regional production of honey and beeswax, export and import quantities and price trends up to 1976. Also information on import duties and ruling trade practices.

GIFTSCHADEN AN BIENENVOLKERN (Poison damage to Bee Colonies) by Hauck, Kuthe, Stute and Wahl. Again a German book (1979). Some very recent research. As far as I could judge with the help of a dictionary, a simple and well written book, warning again about the dangers of chemicals not only to the bees but to all kind of creatures. Giving facts, forgetting emotions.

QUEEN INTRODUCTION, T.S.K. & M.P. Johanson. A 15 page reprint for 1971 Am. Bee Journal. Contains a lot of information on a subject that has its practical problems for many a beekeeper.

APICULTURAL LITERATURE PUBLISHED IN CANADA AND THE U.S. Same authors as above. Very comrehensive list of literature.

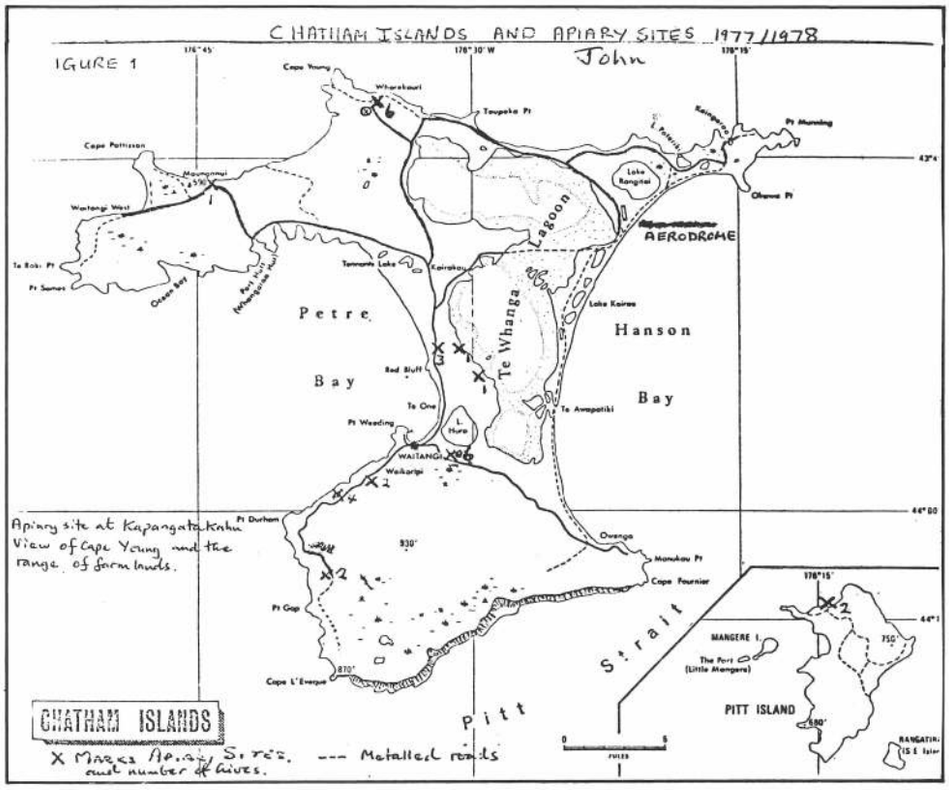
BEGINNING WITH BEES (Beginners seminar held at Telford Farm Training Institute, Nov. 1979). A folder full of hand-outs, pamphlets etc., used at the course was donated to the Library by Trevor Bryant, Ap. Advis. Officer, Gore.

Also donated by Trevor a Min. of Ag. and Fish pamphlet: SHELTER IN SOUTHLAND. Shelter, beauty, shade, bees, legal finance etc. Important to others besides Southlanders. Thank you Trevor.

As you see the library has gained a fair number of books in the past three months. At present the committee is considering the purchase of several publications so that we can keep as up to date as possible.

A lot of books are out on loan at present. Good thing, that is what they are for. A very special customer is form 7 Taradale High School at Havelock North. Pupils are working on the subject "Bees, their niche in our Ecology" and also making a special study of clover. This particular study is a requirement for securing their bursaries. It is pleasant to know that we can help a little outside our own immediate circle.

John Heineman
(Hon. Librarian)
P.O. Box 112, MILTON.



Bees, bee forage and pollination on the Chatham Islands

by R.P. Macfarlane, Scientist,
Department of Scientific and Industrial Research, Lincoln

I VISITED Chatham Islands in January 1976 to assess the status of pollination and beekeeping there. I was also interested in bee forage in view of the possibility of getting bumblebees established there. I examined 12 honeybee hives in six apiaries. This was half the total on the island. One of the 12 hives had been abandoned and was affected by a wax moth.

All hives were being kept by farmers rather than by hobbyists or full time beekeepers.

Pollination

The Chatham Islands provided a rare opportunity to observe the significance of honeybees and bumblebees as pollinators, because of the absence of bumblebees and because honeybees are only found in parts of the islands. *Hylaeus relegatus* is the only native bee. This bee is a less effective pollinator than honey or bumblebees, because it has so few body hairs that carry pollen.

Honeybees are now found in most parts of the world, thanks to their value as honey producers and general pollinators. They are uncommon in alpine or desert areas, and are not found in the tundra and some oceanic islands.

Bumblebees are absent from Australia and most of India and Africa, but are present in alpine, tundra and desert areas as well as a few oceanic islands like Iceland, where there are no honeybees.

The response in seed set of white clover within the flight range of Chatham Islands apiaries was so marked that detailed measurements were not made. No seeded clover was detected beyond 2 km of the small apiaries (none had more than four hives).

Some white clover flowers as close as 1 km from the apiary had a cluster of six to 10 flowers with set seed on one side of the raceme and few were properly pollinated at this distance. Seed set within the vicinity of hives was more consistent than further away from the hives. There was a higher content of white clover in pastures close to hives.

Areas with little or no history of beekeeping in general had less white clover, and its spread was dependent on vegetative growth. It is apparent that higher populations of bees would increase the annual seed set of white clover, which is the major legume on Chatham Islands.

Lotus is potentially useful for the peaty area known locally as "the clears", and it would benefit from a higher population of bees too. Lotus at N.E. Chathams had no seed set, but there were no honeybees there.

Some casual observations were also made on garden plants that benefit from bee pollination. Plants were examined for seed set in a garden at Kiawhata in the northeast of Chatham Islands where there were no hives within at least 16 km, and no honeybees to be seen. The fruit set of the apples, pears and currants was about a fifth to a third of the set in other areas where honeybees were present. A sizeable tree lucerne plant had only a few pods with few seeds in each. There was very little seed set on plume, scarlet runner beans, feijoas and pumpkins. Russell lupins, however, had a moderate seed set.

The native bee, blow flies, flesh flies, and hover flies together were probably responsible for the generally satisfactory fruit set of blackberries and raspberries and, to a lesser extent, gooseberries.

More bees would increase seed set in pasture legumes and fruit production of some garden plants. To achieve a reasonable level of pollination throughout the islands many more hives would be needed, but there are problems in realising the potential for pollination and honey production.

Bumblebees

Bumblebees complement honeybees

for pollination as they do not require management, and, of lesser importance, they forage under more adverse weather conditions (Macfarlane and Donovan 1976).

There were at least two unsuccessful attempts to introduce bumblebees to the Chathams before 1976. They were released in October 1890 and in 1956 a nest of *Bombus ruderatus* was shipped from Lyttelton. Unfortunately the latter shipment was kept on the ship for an extra six days after arrival before the bees were released in an exposed spot near Point Durham. None were seen the next spring.

In 1976 bumblebees of the same species were again taken to Chatham Islands. For this introduction 32 queens were collected from Wairau Valley, Blenheim, between January 14 and 15. The queens were kept in a chillybin during transit from the collection site to their release. Unfortunately this proved to be too early in the summer as more than half the queens, judging by wing wear, were old.

The queens were collected from the Wairau Valley, because the nematode *Sphaerularia bombi* is not present there. All of the queens were inspected for external mites and the few larger *Pneumolaelaps* were removed. All queens were also treated with the miticide Kayacide for the inactive stages of *Kuzinia laevis,* which is so common on them.

Mortality resulting from the high proportion of old queens, and the treatment with miticides led to only three new queens being released at Wharekauri on January 16. A queen was seen around the homestead several weeks later. In the spring of 1979 bumblebees were observed around Waitangi and a specimen sent back proved to be a worker of the species introduced.

Bee forage

The "clears" support a few nectar-bearing plants such as gentians and composites including catsear and hawkbit, but much of this area is covered in wind pollinated monocotyledons and ferns. The sandy beach fringes also have a rather sparse and limited range of nectar bearing shrubs such as Pimelia and herbs. The patches of bush and bush remnants often have some Senecio, Dracophyllum and Olearia, but the value of these native plants as nectar producers is uncertain.

The areas of better soils and pastures generally have at least a moderate succession of forage throughout the season. There is some gorse, blackberry and kowhai available for winter and spring forage. The major summer and autumn sources of forage are white clover, winged and Scotch thistles. Some areas of native flax and boxthorn shelter belts provide a little extra forage. A few attractive and potentially valuable bee forage plants also occur in some gardens.

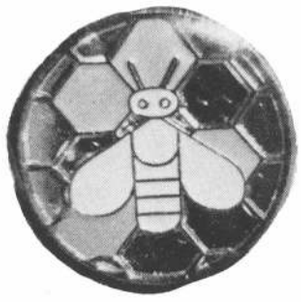
Both tree lucerne and *Echium pininiana,* which is known locally as the giraffe plant are present and flower for long periods in the winter/spring and spring/summer respectively.

The Chatham Islands however, lack some of the more common nectar and pollen producing plants of New Zealand such as broom, nodding thistle, vipers bugloss, foxgloves, wild-turnip, manuka and kanuka (Madden and Healy 1959). There are few cabbage trees, and tree lucerne, gums and wayside plants such as flowering currant are scarce.

Extensive planting of tree lucerne, gums, honey locust and black locust would help to provide more bee forage. Gums, black and honey locust would have the added value of providing durable timber for fencing and construction purposes which is in short supply in the Islands.

Acknowledgements

I would like to thank the islanders for their hospitality and the Lands and Survey Department for assistance with transport and other facilities. I am also indebted to Drs B.J. Donovan and G.W. Ramsay, Entomology Division, DSIR, Lincoln and Auckland and Dr D.C.M. Manson, MAF, Levin, for checking the identity of the native bee and external mites of bumblebees.



A Badge to be proud of

The above picture pays scant compliment to a truly beautiful badge. The Wellington Beekeepers Association is to be congratulated on commissioning the design and arranging for the manufacture of the most beautiful badge used by any beekeeper association. Usually badges are too big, have too much detail and fail to do the job.

This badge is 5/8 inch in diameter smaller than half the photo and stands out brightly in gold, orange and cream.

In one glance it conveys its message and does the job pleasantly.

Use of the badge is not restricted. Send $2 to secretary Frank Lindsay, at 26 Cunliffe Street, Johnsonville and you will be delighted with your investment. Don't blame me if the wife and children all want one each.

Chris Dawson

A tree of many virtues

The Chinese tallow tree *(Sapium sebiferum)* has been recommended for many years by Walter T. Kelley, a bee supply manufacturer in Clarkson, Kentucky. In his catalogue, Mr Kelley says that he has 6 000 tallow trees on his Louisiana bee farm, where they provide shade and lots of mild amber honey. Kelley notes also that the trees grow tall like a maple and withstand hurricanes better than oaks. They bloom for six weeks in the late spring.

"Sunset" magazine recently reported that the Chinese tallow tree is one of the best trees you can plant for fall colour. In California, at least, the leaves turn a brilliant red – sometimes yellow, orange, or purple – and have a translucent quality like that of stained glass. The tree grows very quickly to a height and width of about 35 feet. It is very drought-tolerant yet takes watering without problems, even in a lawn. The tallow tree is hardy to 18 deg. F but may be damaged at colder temperatures. The Walter T. Kelley Company sells seeds of the tree. The Saratoga Horticultural Foundation in California is propagating it for distribution.

– "Bees and Honey", University of Illinois

BURRCOMB

from the editor

New Bee Book Catalogues

The International Bee Research Association has just issued two new catalogues of beekeeping publications. One deals with the 130 or so publications and visual aids available from the International Bee Research Association and the other describes more than 100 books, leaflets and visual aids on beekeeping topics, issued by other publishers throughout the world.

Copies of both List 1 and List 2 may be obtained from the association at Hill House, Gerrards Cross, Bucks SL9 ONR, England, for 25p or $0.50. The lists are free to members of the association and are available on loan from the NBA Library, Box 112, Milton.

David Williams quote collection

"I myself have sat in the garden of his father's old vicarage on the brightest, hottest, and most fulfilled of summer days, the trees in the orchards around heavy with fruit, the scent of hay drifting like incense over all, and the noise of the urgent river drowning the humming of the bees struggling sap-laden through the air so thick and sticky with a honeyed light of its own that they seemed to be swimming in it rather than flying through it."

(A marvellously evocative passage from that excellent work, "Jung And The Story Of Our Time" by Laurens van der Post)

"In her eyes the miller's son was like a honeycomb fresh from the hive, his skin white as the cappings of wax, his hair the colour of honey itself, and the sight of his wet body, with pearly drops of water trickling down from his shoulders to his belly, promised her more delight than a broken honeycomb dripping with the sticky sweet."

From David Garnett's "The Master Cat: the true and unexpurgated story of Puss In Boots."

"of all the arts of the countryside, beekeeping is the one that least lends itself to being taught by a book".

From "Self-Sufficiency" by John and Sally Seymour.

"She made humming noises as she kissed, like a hive of sex-mad bees" is a quote, not from any ordinary love story, but from Gerald Durrell of animal-collecting fame.

"It is important during your training to maintain a reasonable intake of glucose or fructose to supplement the diet and provide sufficient energy without overworking the digestive system by trying to eat extra-large quantities of food. Honey, consisting of about 78 per cent fructose, 20 per cent water and 2 per cent of a few minerals and vitamins, is an ideal carbohydrate and practically a complete energy food, having that added advantage of being easy to digest."

From "Run The Lydiard Way."

And, again, and to show that no image of the bee escapes the rhymesters,

Late season but good

THE MINISTRY of Agriculture's chief honey grader, Colin Rope, reports that good late honey crops are assured in most districts.

Northland-Auckland	600 tonnes	– A good late crop
Bay of Plenty	400 tonnes	– One-third below average
Waikato	1300 tonnes	– Average or better late crop
Hawkes Bay	400 tonnes	– One-third below average
Wairarapa-Taranaki	850 tonnes	– Average
Nelson, Marlborough, Westland	550 tonnes	– Exceptionally good
Canterbury	1250 tonnes	– Another good crop likely
South Canterbury-Otago	1000 tonnes	– Average or better crop
Southland	1500 tonnes	– Very good
New Zealand	7850 tonnes	

For disposal of their crops, Mr Rope suggests producers might consider availing themselves of the N.Z.H.M.A.'s export tax-incentive scheme. Alternatively honey could be offered to a private packer who may pass on some of the benefits of export incentives they receive.

However, he notes that, with a few exceptions, the larger producer-packers have been slow to avail themselves of the tax concessions available to them for exports.

allow me to quote one verse of George William Condor's great hymn "All Things Praise Thee";–

v.3
All things praise Thee; round her zones
Earth, with her ten thousand tones
Rolls a ceaseless choral strain;
Roaring wind and deep-voiced main
Rustling leaf and humming bee
All things praise Thee: Lord, may we.

Talk about going from the sublime to the insectiverous!

Wouldn't it be nice if we had hectares and hectares of flax plant? "November must have been the month, for we were drinking honey from the flax-flowers when they landed at Whangaroa . . . " as the Morioris of the Chatham Islands recorded their invasion and eventual destruction of the Maoris under Pomare.

Amazing what nuggets of information that Guinness Book of Records comes up with, like the quote that a relay of bees would travel four million miles on a fluid gallon of honey. Obviously what the world needs is a little more bee power! I wonder who did the measuring and recording?

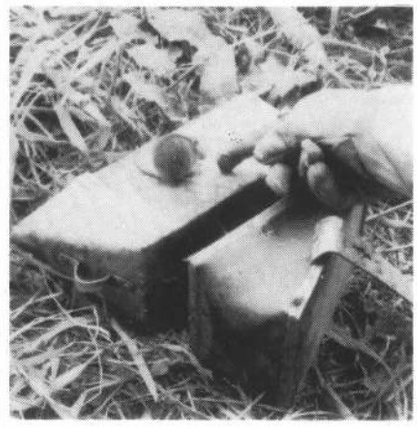
We had fed the heart on fantasies,
The heart's grown brutal from the fare:
More substance in our enmities
Than in our love; O honey bees
Come build in the empty house of the Stare

from "The Stares' Nest by my Window" by W.B. Yeats

What does the bee do?
Bring home honey.
And what does Father do?
Bring home money.
And what does Mother do?
Lay out the money.
And what does baby do?
Eat up the honey.

Christina Georgina Rossetti (of all people!)

MISCELLANIA



You may well ask why. Or even how. But Waikato beekeeper Bryan Mitchell keeps his secret team of performers at home, as part of his labour force.

Snapped before making a recent raid on an infestation of wax moths, this highly trained mouse gets to eat when his feet get the heat.

CORRESPONDENTS

NO 245-T CONTAMINATION

Dear Sir,

I have just finished reading the September issue of the Beekeeper; specifically the '79 Conference Remits. I was bitterly upset to see Remit 39 on 245-T for two reasons

- That a remit as important as this should be lost anyway.
- That the meeting went into committee to come to an answer.

With the vote count the way it was and the fact that they did go into committee one wonders what is it that they are hiding from us.

Yours,

I. Dopson
Featherston

The conference went into committee for the same reasons that you "bitterly" objected to its decision. 245-T is an emotional issue and a poorly worded statement by a delegate could be misconstrued as fact by the press with calamitous results for our honey sales. There is no evidence to date of 245-T contamination of honey, despite regular testing at scientific institutions. May that always prove to be the case.

AUSTRIANS NEED SUMMER WORK

Dear Sir,

We are two Austrians working at the moment in Papua New Guinea. This year we will finish our work here and then we would like to work with a N.Z. beekeeper for one season. We could start working in October 1980. We are both 24 years old. We were keeping bees in Austria. Here in PNG my friend was working as a carpenter and looking after 10 beehives I was working as a beekeeper with the government.

Yours,

Johannes Wruss
P O Box 6104, Boroko
Papua New Guinea

WORK FOR PEACE CORPS?

Dear Sir,

I am working as a beekeeping consultant at the University of The Philipines with the US Peace Corps. I am 32 and have written a book on beekeeping and have taught it for several years. Currently I am working with *Apis cerana* and hope to finish a manuscript on its culture this year. I am also working with the Asiatic bee mite, Varroa, which has now been identified in the United States. I am currently training one Philipine counterpart and am conducting seminars for other volunteers, especially those working with minority tribes.

Is there a beekeeper in New Zealand who would be interested in hiring one or both of us for three to six months as a trainee to learn bee culture in New Zealand?

My trainee is aged 32 as well and we have been working together for more than a year. Previously he was a farm manager of a mission farm. I am very interested in beekeeping techniques in New Zealand and the opportunity to work there would also give my counterpart some first hand experience working with bees.

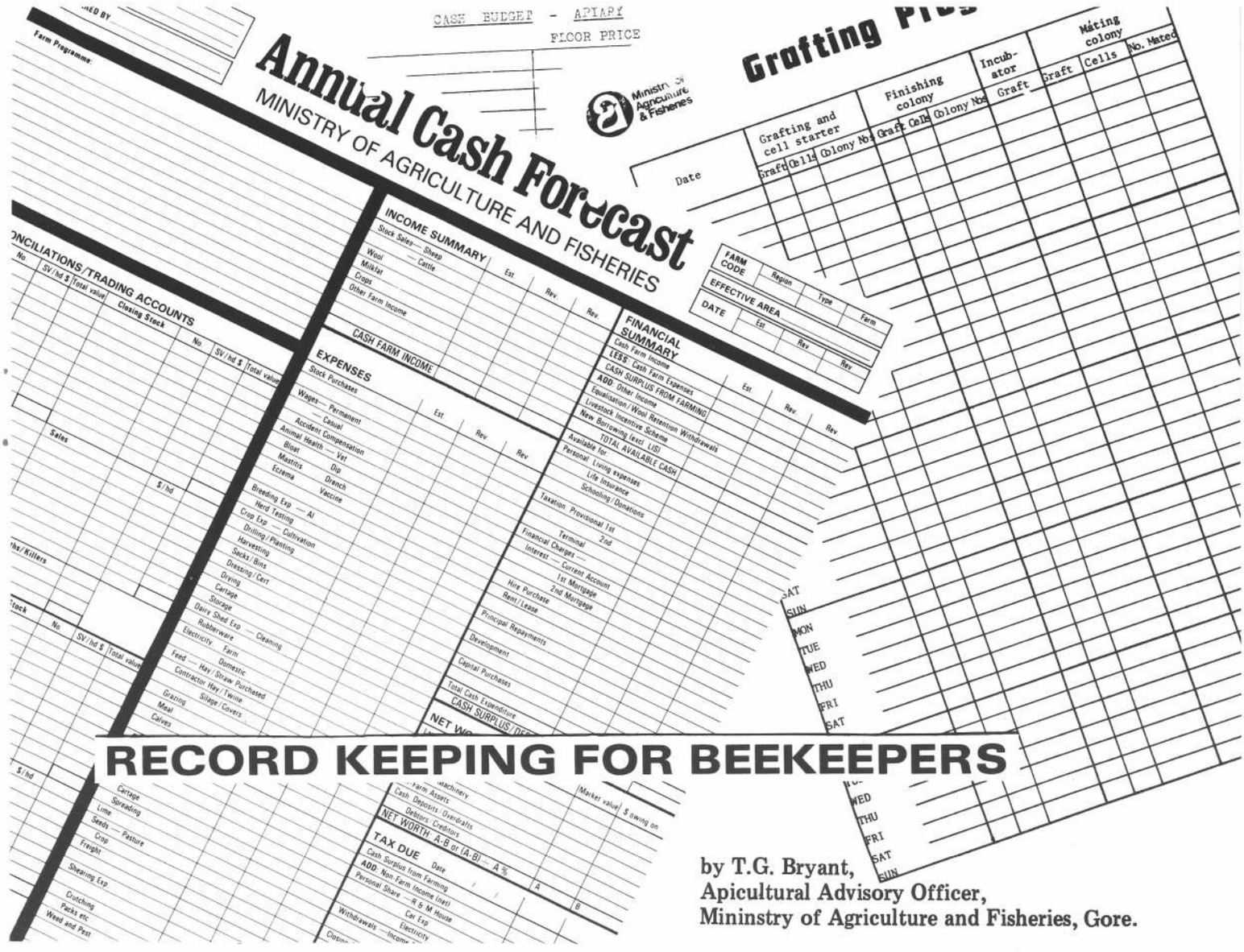
My current job will run out toward the end of August with the start of the rainy season and as I have no further job, I would be available and anxious to help a New Zealand beekeeper, possibly working in the back country, with queen rearing and insemination as these are skills of which I have only a rudimentary knowledge.

I have no contacts in New Zealand and would appreciate any assistance you might be able to give me.

Yours,

Diana Sammataro,
C/- UPLB,
Department of Entomology,
College Laguna,
Philipines 3720.

Anyone who can assist Ms Sammataro should write direct to her at the above address.



by T.G. Bryant,
Apicultural Advisory Officer,
Mininstry of Agriculture and Fisheries, Gore.

IT IS NOW more necessary than ever to keep records; costs are continually rising and the capital commitment of the apiarist is at a very high level. For instance the value of the beehive has increased 500 per cent in eight years.

The capital involved in the ordinary one-man outfit is now in excess of $90 000 and it is becoming very difficult for young men to enter the industry.

Incomes are higher. In eight years honey has increased in value 400 per cent. As a beekeeper you are earning more money yet the difference between solvency and bankruptcy is still marginal. Beekeeping can no longer be regarded as a way of life, it is a business venture.

Records give greater control to the beekeeper, whether this is simply for living or for development. But records must not become tedious or be fobbed off until the next rainy day. To be effective, records must be kept up-to-date and a day each month should be set aside to carry out the book work.

The many types of records that can be kept by the beekeeper. Typically, there are:

- **Physical records:**
  Development programmes;
  Apiary records;
  Work plans;
  Management programmes.
- **Beekeeping administration:**
  Cash records;
  Finance budgeting;
  Cash profiles.

Let's look at these records in more detail:

Physical records

This heading covers a multitude of physical records which could be maintained. But as with all records, they are only of use if you use them. Your management diary should cover such things as the number of apiaries and hives, locality, farmers' names, dates of visits, what you found, what you did, and what will be required on future visits.

Physical records should include a 'planning calendar'. This has columns in which to note various activities that happen during the course of the year. You cannot expect to remember everything that happens and when it happens, however, if it is written down it serves as a timely reminder. For instance you may need to encourage drone production as early as July-August if you wish to produce October-mated queen bees.

Maps with apiary distribution and localities are useful, especially when you employ labour. Such maps should also include your neighbour's sites. They give a greater understanding of your district stocking rate and can allow you to expand if you interrelate this with other records, such as, honey production, weather, floral sources, and so on.

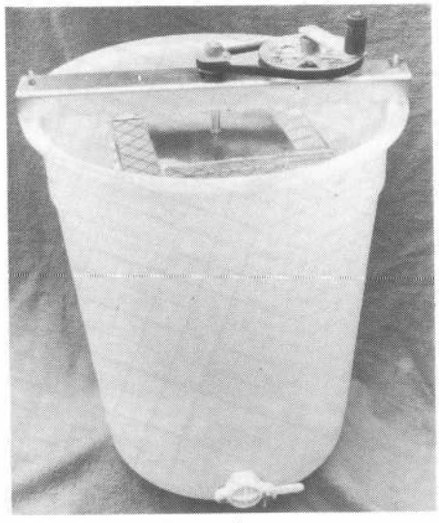
The keeping of accurate bee breeding records is essential if we are to improve our bee stocks in New Zealand. Bee breeding offers one of the best ways of increasing honey production, but we cannot achieve this without accurate records detailing such items as performance, parentage, behaviour, colour, etc.

You can overdo the amount of records kept. Keep only those records which will be of use to you. You do not want to become inundated with too much paper.

To establish your requirements it is

HONEY EXTRACTOR

FOUR FRAME



ONLY $156-

write for detailed information to manufacturer

KEITH WALKER,
62 St.Andrews Road
Epsom, AUCKLAND 3

POLLEN GRANULES

We require Pollen Granules which must be clean, free from moth eggs, larvae and insect fragments.

The moisture content should be 8 per cent to 10 per cent, but may not exceed 10 per cent and the heat used in drying must not exceed 120 deg F (49 deg C). The dried product must be stored in poly-lined four gallon lever lid tins, or double poly-lined corrugated cartons, and sealed so as to exclude air, light and the possibility of moisture uptake.

Lowest quality $7.00 per kg
Best quality $9.00 per kg

all prices into our store Auckland or rail,Penrose

Please forward any samples and quantity available to Healtheries of New Zealand Ltd., P.O.Box 11-201, Ellerslie, Auckland.

Pack your product in Polypails

"We top the lot for all you've got"

CPI Polypails set completely new standards for the packaging of foodstuffs, chemicals, paints liquids, semi-solids, gels, pellets,etc. Chemically neutral, acid resistant, non-rusting one piece polythene construction. No seams to burst, safety-seal lids, easier safer handling. Longer, more secure shelf and store life for products. Reusable or disposable. Sizes = 4, 5, 10 & 20 litres.

"Pretty well anything Packs in a Polypail"

POLYPAIL

Send for our brochure 5377B
Manufactured under exclusive licence from Marquis Plastics of Australia.

CPI **CONSOLIDATED PLASTICS LTD,**
INDUSTRIAL SALES DEPARTMENT
P.O. BOX 3675, AUCKLAND. PHONE 599-129

Name .....
Address .....
.....
Type of Industry .....

suggested that you sit down with your partner or wife and write down exactly what your present situation is and what you want to achieve.

Then set your goals and how you would like to achieve them. Then take a look at your financial position and determine whether you can accomplish these goals. Decide what records are necessary to keep a check on your progress and to remind you of how you are going to achieve them.

Beekeeping administration

Administration can be defined as the book work necessary to enable a business to move with the times. It must be simple, reliable, efficient, and a cheap system of recording beekeeping business transactions.

Your first aim is to be able to minimise the time and fuss, yet at the end of the exercise to present your accountant with all the relative information necessary for an end of the year balance. To understand the administrative 'system' and how it works see Fig. 1.

The Box file

For simplicity it is recommended that the box file, or lever arch, system be used as the basis for your beekeeping records. It is inexpensive, easy to use and transport, and it is reasonably fireproof.

Within the box file, invoice statements and credit notes should be arranged and filed under subject headings. Decide on a day every month on which to write cheques, working from the box file index. The 20th of each month is probably the best time. Fill out cheque butts first with full details of expenditure. Transpose the cheque number on to the invoice and then write the details into your cash book.

As companies issue receipts for your payments file them at the back of the index section or in a separate box file.

I recommend separate business and personal cheque accounts, but be sure items which are tax deductable are not paid with a personal cheque. When in doubt use the business account. All income must be paid into the business account. The personal account is then funded with an automatic bank transfer each month. The personal account should preferably be a joint account held with your spouse.

Multi-columnar cash recording

A simple addition to the administration system already described is the multi-columnar cash record system. Minimal time is required to note each cheque on the multi-columnar sheet once the format of the record system has been adopted. Column headings would include details of the payment and the major categories of expenditure eg, wages, repairs and maintenance, vehicles expenses, feeding, hive and bee purchases, standing charges.

Details are entered in the multi-columnar cash book as the cheques are written. Enter the date, cheque number, receipt number and details of the payment. Do not forget the automatic deductions made by your bank for bank fees, interest and insurance etc. Some payments cover items in several categories, in which case it may be necessary to work through the invoices. Each purchase would go under the appropriate column heading.

At monthly, bimonthly or quarterly intervals each column is totalled and a new page started. The totals are transferred to the top of the new page.

Cash Forecasts

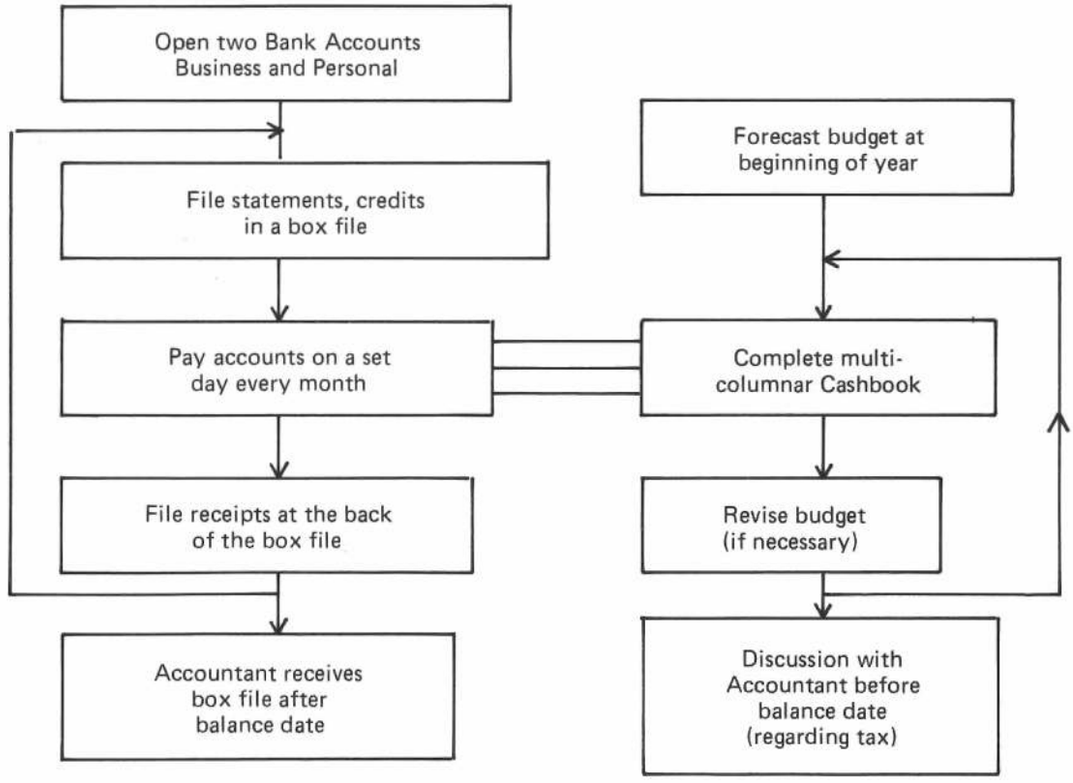
Forecasts endeavour to predict the future so that your activities can be arranged to suit an unexpected situation. Of course the unexpected can also happen but this does not destroy the value of forecasting. In fact cash forecasts make it easier to gauge the impact of unexpected changes as they occur.

Cash forecasting can best be explained if you have a personal discussion with your district apicultural officer or economics adviser. In essence cash forecasting involves undertaking a budgeting exercise and drawing up a cash flow for the coming year and then comparing this with actual expenditure.

Cash forecasting assists you to monitor your financial position and to make payments or investments on a planned, considered basis. Forecast can certainly help reduce tax levels by drawing your attention to the amount of uncommitted, and taxable, cash likely to be carried over at balance date. A bank manager would be more sympathetic to extending overdraft facilities to you if he/she can see a favourable improvement in your cash flow.

If you have not the time to do the

Figure 1: A typical administration system



additional book work associated with cash forecasting then it is respectfully suggested that you may need to examine your attitude towards your business and your responsibilities to your family. If you find you still do not have the time then it is advisable to have your accountant prepare your accounts every two months throughout the year.

He can then advise you on your financial position and this will eliminate the need to keep a cash book. However, you will have to pay for this additional service. For most beekeepers there is a great deal of self satisfaction to be gained from knowing you are in full control of your business simply by maintaining your own books.

Your accountant

Do not use your accountant simply to put in your tax return. His time is more valuable and his services can be better utilized in other areas. Aim to give him everything that is required and in an orderly form. His fees are higher the more difficult the processing. You should avoid an "it's all in the box" attitude, and the presentation of confusing cheque butt details.

The Inland Revenue Department and private tax consultants can assist you with the presentation of tax returns.

When employing an accountant be sure to:

- Spend time with him and find out what he requires and be sure to tell him what you require.
- Preferably present your books two months before balance date. In other words find out before the financial year is wrapped up if you require an overdraft to pay the tax bill or if you should spend some cash to save paying unnecessary tax.
- Discuss with him your end-of-year books; know how to interpret them and use them as a management tool. To help you with this be sure your accountant encloses with your balance sheet:

(a) A revenue statement. This summarises the year's transactions and compares with the balance sheet. Revenue statements are generally divided into three accounts:

Enterprise accounts i.e. a summary of transactions of each production unit e.g. beekeeping and packing of honey

Working accounts summarise the trading activities of the business e.g. gross profit from (i) is offset against enterprise accounts.

Income adjustments and appropriation accounts. These distribute the net profit e.g. present taxation results that balance the owner's capital.

(b) A cash flow statement. This is a summary of cash transactions.

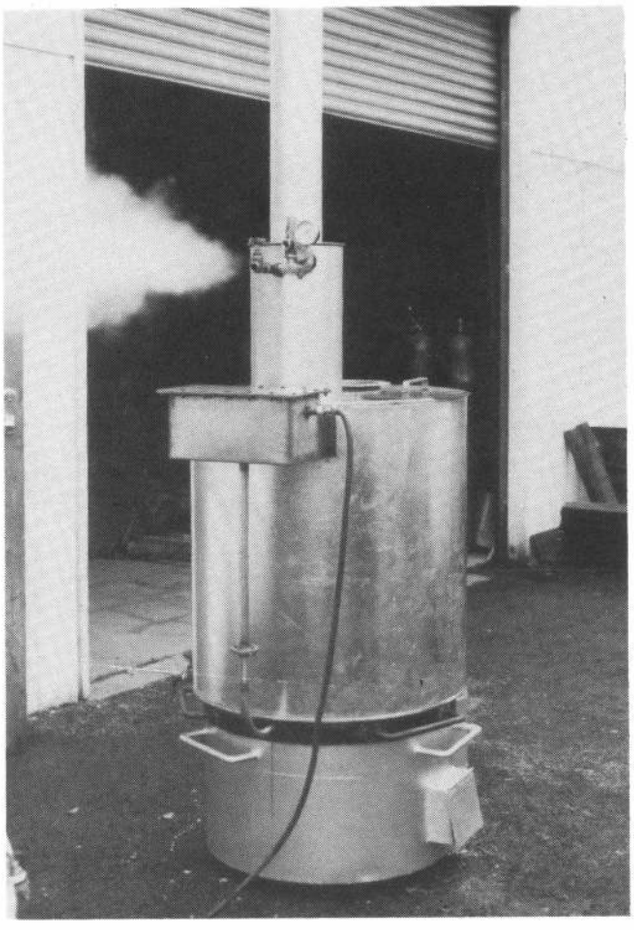
When known cash items are excluded it is possible to reconcile your tax accounts with your working capital position.

(c) Report of taxation.

With a full set of accounts along with your balance sheet, it is easy to fully understand the business and its financial postion. These accounts will allow you to make decisions which should improve the financial position of the business in the coming years.

References:

The following MAF Aglink publications in the Farm Production and Practice series can be obtained from most ministry offices:
Business Management Administriation: Filing, Information, Payments and Accounts FPP1/1
Business Management Administration: Cash Records FPP 19/2
Business Management Administration: Cash Forecasts FPP 102/4
Business Management Administration: Farm Records FPP 20/3



The ripple flow steam generator under test at Bosca Industries, Hamilton.

Bosca builds boiler for Beekeepers

by Murray Reid,
Apicultural Advisory officer,
Ministry of Agriculture and Fisheries,
Hamilton.

MANY BOILERS owned by beekeepers are starting to show their age, and I suspect they are getting a little dangerous as well. Kerry Simpson – now Apicultural Advisory Officer, Palmerston North, began the hunt for a suitable alternative last June.

We specifically wanted a wood or coal burning unit to take advantage of the *tax rebates on indigenous fuels – not to mention the plentiful supply of wood most beekeepers seem to have lying around!

The situation was not at all hopeful until we blundered across Bosca Industries in Hamilton. By a happy accident they were also looking at adapting their famous domestic heaters to produce steam.

Since that initial contact there has been much consultation, doodling, trips overseas and designing and redesigning. The result is a "Ripple flow steam generator" that will burn wood, coal, sawdust, paper or any other rubbish.

Our original specifications were for a low pressure steam unit that would burn waste material and we weren't too worried about fuel consumption or smoke pollution. The unit was to be used primarily to melt down old combs.

However, the prototype built by Bosca has such an efficient firebox that it is almost smokeless and very efficient on fuel.

It can now be used to heat uncappers, extractors, hot rooms, water baths for melting out tins of honey or even swimming pools as well as old combs. It may only need stoking 2-4 times a day depending on the steam output and the fuel being used. And you don't have to wait all day for "steam up" either.

In fact the prototype takes only 12 minutes with newspaper alone and about 14-15 minutes with paper and wood. The fire even survived being accidentally doused with half a clean-sack full of vermiculite insulating material one day and still come up to steam in 15 minutes. Mind you there was a little more smoke than usual!

The refractory lining in the firebox is so good that there will still be hot coals next day if the unit is dampered down at night. In fact after one test run using wood the boiler was left idle for about a week. The ashes were still hot enough after all that time to set some paper alight in a rubbish bin.

Now for some boring but necessary technical details supplied by the Bosca engineers. The diagram gives the dimensions and some construction details of the boiler.

Capacity

The unit has a capacity of 0.015 m^3 (1.71 ft^3) of water and a radiant heating surface of 2.15 m^2 (23 ft^2).

Tests conducted on the unit at a steady pressure of 35 kPa (5 psi) showed a steam generation capacity of 73 kg per hour (160 lbs per hour), which amounts to 34 kg per m^2/hr (7 lbs per ft^2/hr) or, put it another way, the unit can generate about 5 hp.

Design and Construction

The unit is built in two separate sections which are not fixed to each other.

A base section is constructed in 10 gauge mild steel and is lined with high grade, Fyrecrete H.D. 40 per cent alumina refractory capable of operating at 1 450 deg C. (2 642 deg F). This base section forms the fuel bed, there being no grate required for this design.

Mounted vertically upon the base section is a ripple-flow heat exchanger formed as a narrow water jacket between two concentric shells joined to a top water drum. Both the inner shell and bottom of the water drum are exposed to radiant heat.

The heat exchanger is robustly constructed in ten gauge mildsteel, corrugated to provide a more efficient heat transfer surface while allowing flexibility for free expansion in the event of rapid temperature rise.

A special patented feature of this design of heat exchanger is the rapid heat transfer brought about by the high rate of water circulation between the concentric corrugated shells. The inner

corrugated shell is exposed to the radiant heat of the flame and as it accepts heat, the water rises and ripples between the two narrowly spaced corrugated surfaces. This rippling effect sets up a pulsation between the two surfaces which produces the exceptionally high rate of turbulence and heat transfer obtained from this design of heat exchanger.

A steam separation chamber is built as an extension of the steam space and extends up the chimney.

Exhaust gases from the furnace pass through the steam separation chamber and act as a superheat section of the heat transfer surface. Tests on the unit have shown that the saturated steam generated is free from entrained moisture and that the steam generated has a high dryness fraction.

Control of the unit has been maintained as simple and as trouble free as possible. A float control is housed inside a pressurised stainless steel float chamber and maintains a constant water level in the water drum. The flood valve is fitted inside the chamber with the filling connection sealed at the chamber wall and designed to take a ½ inch hose connection which may be taken to any hose tap.

This arrangement ensures that there are no moving parts exterior to the unit and no glands to leak or require maintenance. A tap is provided to draw off hot water at the base of the boiler.

Combustion air is admitted to the furnace on the down-draught principle by way of an air injection cone. The cone is fitted with a flat cover which may be swung aside to allow full air flow or may be closed completely to shut off combustion altogether. Any itermediate position of the cone cover will determine the rate of combustion and heat transfer in the combustion chamber. Fuel is fed in through this top cone.

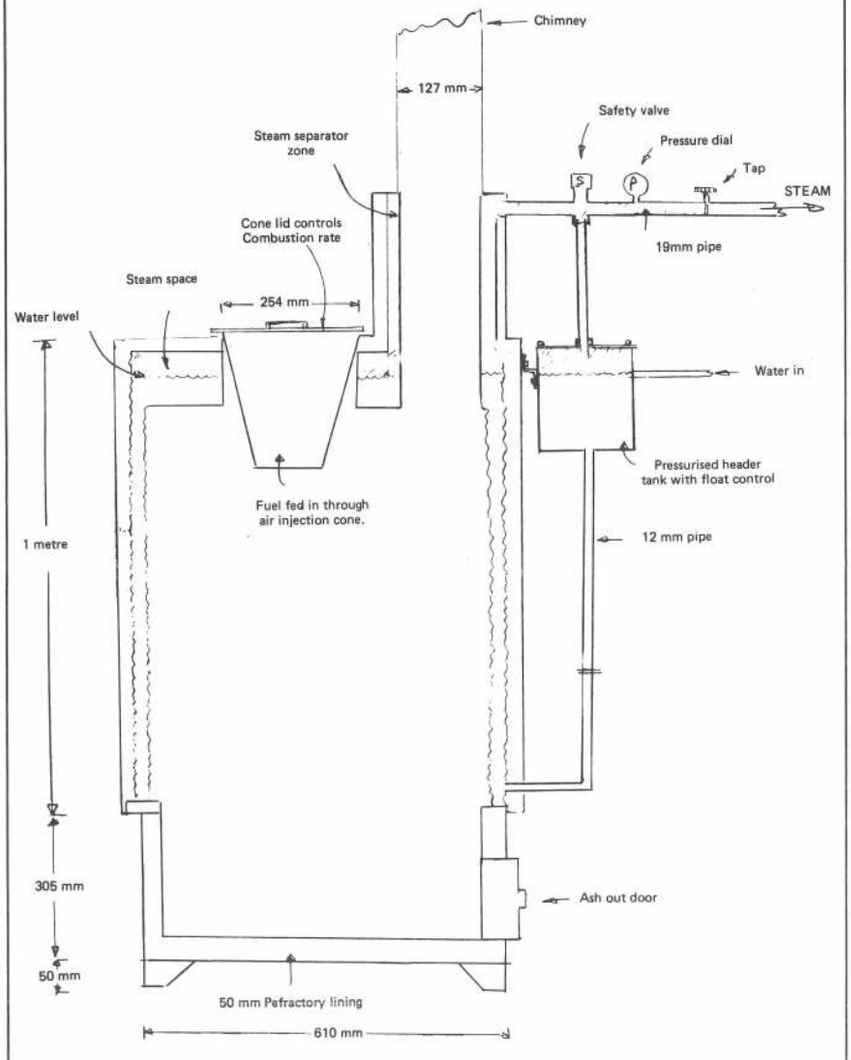
In practice, the system has been found to be a remarkably simple and effective method of controlling the steam output from the generator.

The aim of the design is to provide a robust piece of equipment which will be reliable in service, simple to operate, and will have a long satisfactory life in the field.

Insulated with high temperature fibreglass and clad with galvanised sheet, the unit presents a neat and pleasing appearance.

And there you have it. The big question you're all asking by now of course is how much. I hope you'll be pleasantly surprised. The current price which includes the 10 per cent sales tax is $1 680 freight free in the North Island. Sorry you South Island chaps, but don't despair. Freight to anywhere in the South Island is only $34.

BOSCA RIPPLE FLOW STEAM GENERATOR



The fire box base unit is very heavy, but the boiler unit lifts on and off quite easily. So if you had more than one base, or perhaps mounted the base on castors, then you could move the boiler from the honey house to the wax room, to the swimming pool, to the glasshouse, or to the sauna or wherever.

These units can also be used as incinerators or to heat the domestic hot water cylinder. However, if you planned to use it for household water it would be advisable to have the heat exchanger made in stainless steel.

Bosca are planning to make other models that would double as incinerators, swimming or spa pool heaters and barbeques.

Your contact at Bosca Industries is Peter Keegan or Neil Martin, P O Box 5494, Frankton, Hamilton or phone Hamilton 73679 or 78236.

** 100 per cent of purchase price can be claimed off tax for new plant designed to use natural energy resources. It may be possible to claim the 10 per cent sales tax as well. All the relevant information is in Bulletin No.5 "Incentives for Captial Expenditure on Energy Conservation and Use", Ministry of Energy Resources, Box 5082, Wellington.*

If much of my writing betrays a desperate sympathy for the absolute beginner, this is because of the clarity with which I recall my first fumbling efforts in beekeeping — the anguish as the bees showed their displeasure once again, the screams of "What did I do wrong?" as yet another catastrophe came into focus.

I must be honest and say I cannot see any way this beginner's phase can be wholly avoided, nor can I say at what stage the transition from beginner to amateur takes place.

Gradually, very gradually, the bees and I came to an understanding, but it was a slow, tentative thing with many a reversion to barbarism.

Some beekeepers are more fortunate than others in this respect, but I still remember shivering in bed after receiving what I swear was 300 stings, mostly through socks at the ankles, the times I told the neighbours the bees would never swarm again, and they did, the time I was carrying a partly filled super of honey and dropped it on the concrete, the times the bees have been so upset at being disturbed that it was unsafe to go out of the house for three days for fear one last, lingering belligerent would still be on patrol, and a score of other incidents.

All I can say to beginners is that most of us go through some sort of purgatory at the beginning. Some simply give up, others have fought on and made it to the other side.

It is up to you to decide if the journey is worthwhile. I hope you will decide it is.

Caged queens and how to cope with them

by David Williams, Rotorua

I KNOW I have gone through the technique elsewhere in this series, but might as well formalise it here. Once again:

Buying of queens and introduction to your hives is the simplest and most reliable and genetically advantageous method of requeening. This has been said before so will not be discussed here. Instead, this will be a short description of the actual mechanics of the operation.

Ordering queens

This is simply done. There are various queen breeders around the country. Some advertise, some do not. You will only have the first available to you.

You will see in the journal the names and addresses of breeders wishing to sell you their livestock, the price – usually with a slight reduction for increasing quantity ordered – and times of availability (these often a little weather-dependent if you want early delivery).

You will probably prefer to pay in advance, and may also pre-pay for a telegram to you from the breeder as a sort of 24-hour warning that they are on the way.

Travel

Queens are posted to you (unless you prefer to pick them up direct and are close enough to do so) in neat little cages, each queen with half a dozen attendant workers to look after her en route, and with one end of the ventilated cage blocked by a stiff mixture of honey and powdered sugar known as queen cage candy. This is sufficient to sustain them for some weeks if necessary.

Arrival

The Post Office will usually ring you up when the queens arrive at their depot, particularly if you have supplied your phone number to the queen breeder for him to add to the address label.

I usually get the call at 6.30 am or so and the Post Office employees regard it as hilarious that bees can come by post. They should certainly be collected as soon as possible.

Storage

Experts can easily store caged queens in queen banks in hives. You neither need to know or have the experience to do this successfully.

As soon as you have them at home, dabble a few drops of water in each cage. This enables them to control the atmosphere to some degree and is also used to dissolve the candy as they need it. They may manage without it, but are better with it.

Continue to do this a couple of times a day as long as they have to be kept. They should be kept anywhere sheltered, warm but not too hot, inside, and away from noxious fumes, spiders, children, or any other threat or disturbance.

Introduction

Naturally you want to get them into your hives as soon as possible. So, on the first suitable day, go through each hive in turn and kill off the old queen. She is most likely to be somewhere on the centre combs of the bottom brood chamber. Look there first. When found, simply flick her off the comb and onto the grass and tread on her. Break away the end of the queen cage, candy end down, between two central combs. Close the hive down and leave alone.

The breaking away applies whether the cage is plastic, which has a specially weakened portion of the edge over the candy, or wood, where you remove the small strip of cardboard etc, fastened on the end.

I do not recommend a queenless period – this merely seems to disturb the hive more than necessary. I kill off and insert and have not had a failure yet as far as I know.

It is important to put candy end-down in hive to stop any melted candy or other debris dropping onto queen.

Keep the queen cages out of sun while carrying round. And if all else fails, read the instructions that usually come with them!

Flowers, pollen and nectar

Story: David Williams, photos: Allan Warren

NATURE DOES nothing without a reason, though we may not always be privileged to know what that reason is. In the case of the flowers, we do: Their purpose is to ensure the process of propagation of the species.

We all know the simple structure of a flower with its stamen, anthers and nectar production.

What is the nectar for? Stamen and anthers are the sexual parts, but the nectar has no function in the reproductive process except that of attracting the pollinating agencies. It is bait. Not necessarily bait for *Apis mellifera.* Let us not forget that there are at least 10 000 other species of bees in the world as well as all the other nectar sippers – butterflies, moths, beetles, birds, flies, wasps, lizards, to name but a few – just as not all plants produce nectar.

Nature has her own infinite variety of ways and means. Some plants rely on wind pollination and produce very little nectar, others none at all. The range of flowers attractive to bees and their like is quite small.

Nectar itself is a by-product of the extremely complex formation of carbohydrates in green plants involving the conversion of sunlight into energy, a reaction made possible by the catalytic action of chlorophyll. It is this vast chemical activity that keeps the world and us alive and well and eating and breathing – which is another by-product.

Carbohydrates are themselves complex carbon compounds including sugars, starches, cellulose and a host of others. Most of these substances are used for the plant's own purposes in either growth extension or consolidation but nectar itself is a highly concentrated sugar solution surplus to the plant's direct requirements and exuded for the specific purpose of luring the pollinator.

Flower structure

Before discussing nectar further it might be a wise move to refresh our memory of basic botany.

First of all, what is a flower? That pretty thing in the garden, you might say, and be only partly right. A flower would properly be regarded as the reproductive unit of one section of the plant kingdom (others, such as ferns, have leaves but no flowers, while mosses and their relations have neither).

The plant kingdom manages these things much better than we do. None of the fuss and bother we human animals go through just to get the next generation to the starting gate.

Many species have flowers which contain both the male and female elements, but this is not the complete answer to getting the two together. Because even here nature may guard against inbreeding by triggering pollen production at a time when the ovary is not yet ready to receive it, hence pollen from that flower may fertilise another flower elsewhere whose reproductive clock is slightly offset relative to the first, and vice versa.

Nor should you forget that large, highly-coloured garden flowers are atypical and are greatly outnumbered by plants whose flowers are inconspicuous but equally efficient.

Let us look at the basic structure of the flower itself. If it is complete it will include both male and female elements – the stamen and the pistil.

The stamen: The stamen may be divided into two parts, the filiment and the anther. The filament is, as its name implies, a slim spike on top of which is perched the anther, the pollen creating and containing section.

Anthers generally form a ring around the pistil.

The pistil: The pistil is the female half of the partnership. It is usually central, more solid, and more functional, consisting as it does of an ovary at the base, a columnar style to elevate the top segment, the stigma, and get it up to where it can perform its pollen-catching function.

Pollen: What exactly is this function? To explain this we have to go back and talk about pollen.

Nature is not only devious but also amazingly liberal. It has been estimated that some species of plants produce 18 million times as much pollen as the species could possibly use for the purposes of fertilisation. The rest represents a safety factor. A large safety factor.

The few pollen grains a bee packs back to the hive on each trip are ludicrously trivial, and the few pollen grains distributed by that bee are only a slight proportion even of this, but a vital one.

Pollen forms and matures in the anthers. When mature, the anther dehisces, opens up in some way either by splitting, by 'peeling' like a banana or by releasing a cap, and the pollen is available for transportation either by wind, insect, rain splash or some other agency.

Wind-distributed pollen grains are small, light and dry, but insect-attracting ones, which are usually ridged in some way to allow for expansion and contraction, are slightly sticky and comparatively large.

It only takes one pollen grain to fertilise one flower, if it is that sort of flower. The grain settles on the stigma and pokes out a pollen strand through a thin spot in its covering. This tube contains the male gametes and these are transmitted into the stigma, down the style, and so to the basal ovary, thus setting the whole seed-production unit into gear.

This much over-simplified exposition may assist in understanding the process and also the part that bees play in fertilisation of a few, a very few, of the plants we know.

Nectar: We now come to consider the part that nectar plays in all this. Nectar is produced by certain specific glands known as nectaries. The glands are at the base of the flower and their secretion serves no physiological purpose though it may have a slight anti-dessicant effect.

Basically the nectar is here to attract insects to the base of the floral cup and thus ensure that pollen grains clinging to the insect come into contact with the stigma, a wonderfully intricate and ingenious method.

A bee may visit 20 000 flowers on each nectar-gathering trip, but the amount of nectar produced, and hence the number of flowers visited varies enormously between species as well as with other factors.

Variation

The plum, for example, sees no necessity to produce large quantities of nectar to attract insects – at the time it blooms there is little else around, so it's plum or nothing.

Even so, early in the season poor weather may prevent the bees reaching the flowers at all and, if they did, they could well find that rain had washed what little nectar there was away, which is another reason plum feels it unwise to overdo things.

Other plant species produce nectar abundantly and joyously in their appointed season under correct conditions of time, temperature and humidity, culminating in the honey flow, a time of maximum sunshine, maximum production and hence, by inference, maximum seed set in the participating flowers.

There seems to be some opinion that the bees must concentrate nectar to honey before they can use it for food. This is not strictly true. Field bees allow a portion of the nectar they gather to pass through their digestive system when on trips.

Admittedly this has to be at a certain

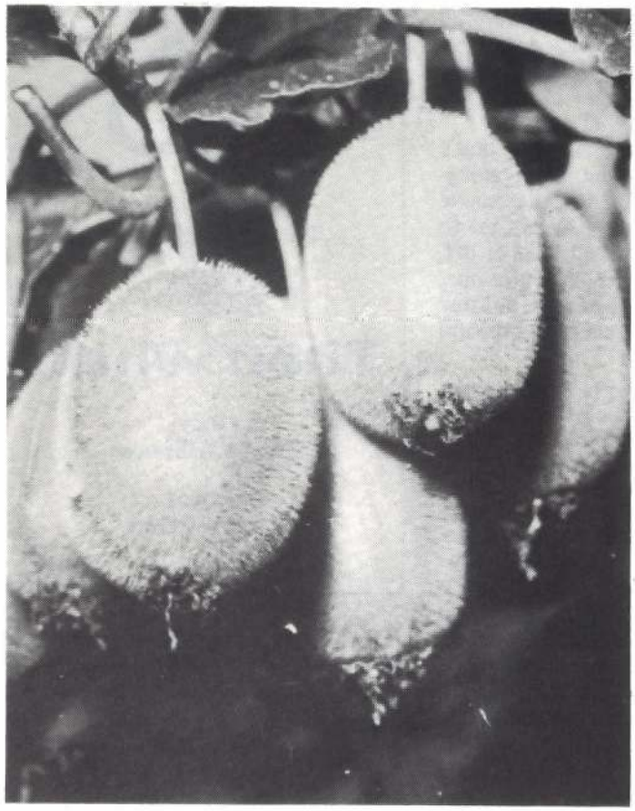
concentration before they will take the trouble to gather it in the first place but this concentration is far lower than it will be reduced to back at the hive.

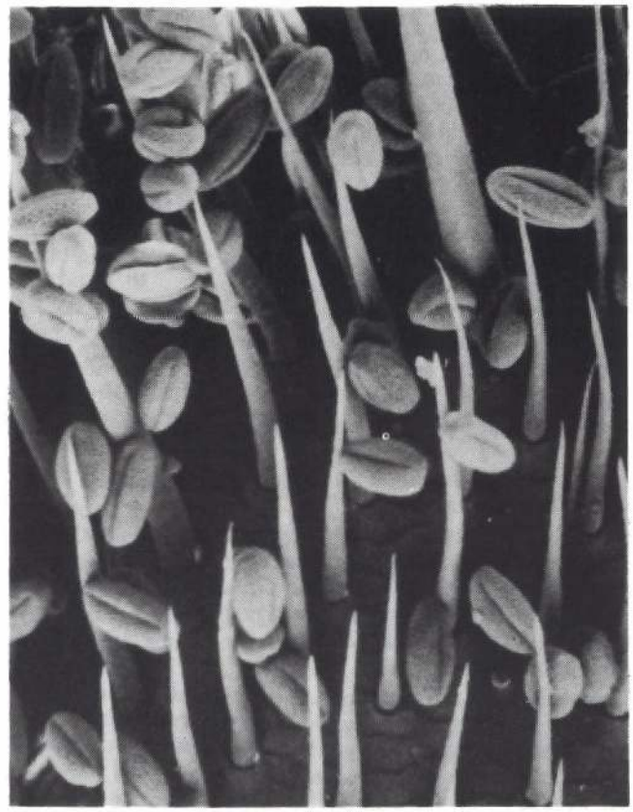
There it becomes a syrup at a concentration high enough to prevent spoilage and to act as a low-volume, high-energy food for both brood and hive inhabitants. And so the yearly cycle continues.

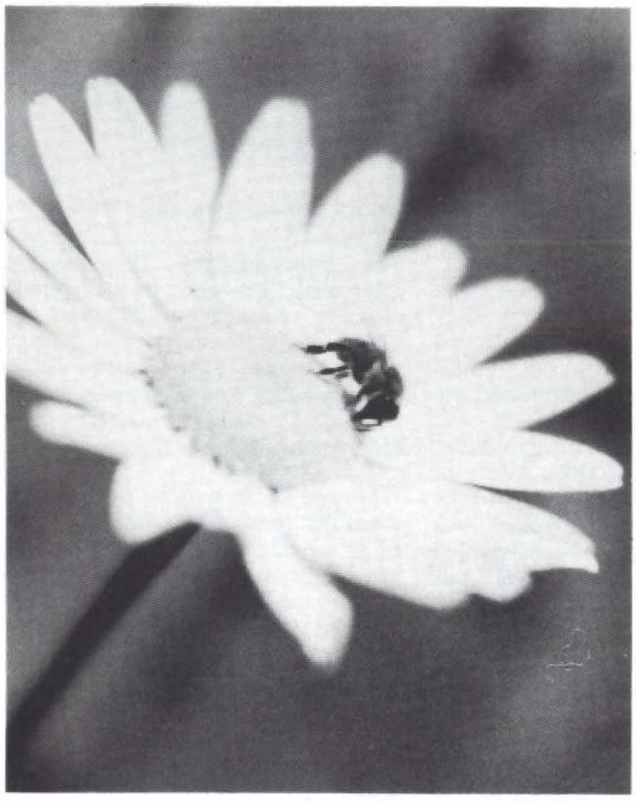
Town and around

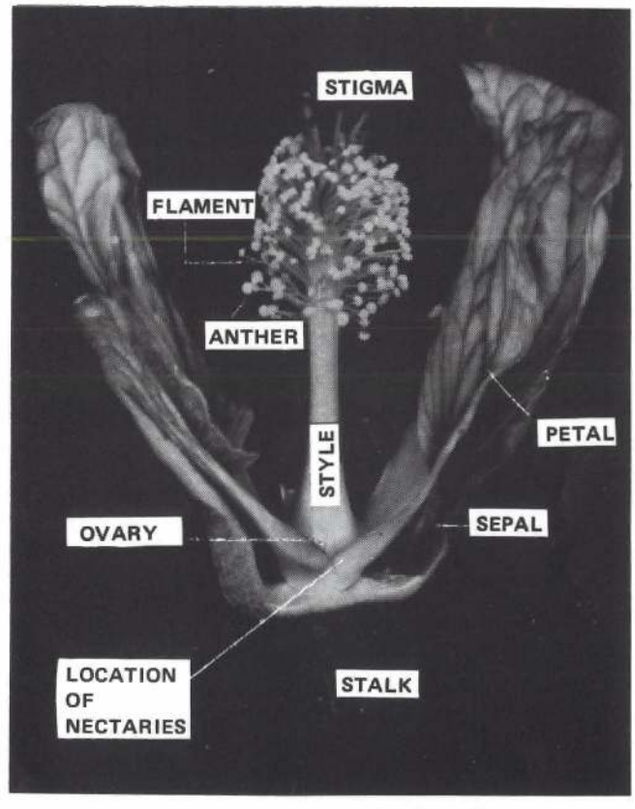
R.S. Walsh's "Nectar and pollen sources in New Zealand" is an excellent booklet and should be known to both amateurs and professionals.

However, the urban beekeeper's lot would be somewhat different from his – Buddleia, Grevillea, Lilac, asparagus, cotoneaster, beans, peas, the brassicas and others all feature prominently on mine while our metre square plot of mint will keep them happy for hours. After all, flowers is flowers.









Photos from top left, clockwise: Kiwifruit – no bees, few fruit; pollen grains entangled in the "hair" on a bees foot; the sex shoppe itself; the customer who keeps the shop in business.

A FRESH START

PART 7

Queen production for amateurs

Then what?

story
David Williams

photos
Allan Warren

THE PREVIOUS articles have given you a choice of methods for the raising of queen cells. Having followed them, you now have a number of fat, healthy sealed cells in one of your hives, in an easily removable form. You obviously have them there for some purpose. What do you do next?

- In 11 days time those cells MUST be used
- So two or three days before this, do what preparation has to be done by either removing queens that are to be replaced from their hives or prepare series of three frame nuclei, taking these numbers of frames from hives (checking queen is not with them), preferably brood and stores, but certainly stores and bees, placing them around area, blocking entrance with grass.
- Then, on the eleventh day, give each hive or nuclei a cell, inserting them with a minimum of fuss.
- Check one week later that queens have hatched successfully, or one month later if in nuc, with minimum of smoke and upset.
- And I'm sorry, but once you've started your cell raising the rest listed above has to be done and at the times stated whether it's rain, hail, or a raging typhoon – the bees won't wait for your convenience.

Obviously there are two separate issues here. If your object is swarm prevention, then you want a new young queen into your hive as soon as possible, and the month's wait for a nuclei to settle down before you can unite it with a hive may give that hive all the time it wants to swarm and otherwise behave anti-socially.

On the other hand, nucs are less trouble, less prone to swarm, may be used as and when required, or left to build up by themselves, and are a real asset to the beginner.

The choice is yours. As long as you handle everything correctly and time everything correctly, you will have no problems, and if you do have problems, your checks will show you what they are and you can get right in there and correct them.

How to unite nuc and hive? If that's your intention, position them alongside when first making up, then move 'em closer later, then when its time to unite, find old queen and kill her off, put sheet of newspaper on top of nuc, move original hive out of way, put nuc in its place, put hive back on top, and there they are, united.

I like to put a few slits in newspaper with my hive tool. Bees will eat out paper and unite happily.

When?

When should all this queen rearing take place? September. Why? Because to do any good you must get your queens early. Nobody wants or needs queens later in the season. By that time any hive that is going to swarm has swarmed, and the honey season is about to start, during which no self-respecting hive swarms anyway. These are times to leave them alone.

So, the first week in September (making due allowance for the fact that I live in Rotorua – you can make your own offset for that) or the first fine spell after. Why not autumn?

In autumn you have the same adverse conditions and uncertainties that you have in spring, and some additional ones: The weather is often no better. There is the difficulty of manipulating hives now choked with honey. The natural tendency of the bees is towards spring queen rearing. Bees are usually

Honey in relation to infant botulism

BOTULISM IS A type of food poisoning that occurs very rarely. An outbreak is likely to affect a number of people who have all eaten the same item of contaminated food, and over half of them may die. In the USA between 1900 and 1950 the mortality rate was 60 per cent to 70 per cent, but improved treatment methods have now reduced it to 13 per cent. There were 48 cases in 1978.

The poisoning is caused by ingestion of a neural toxin which is produced as a by-product of the metabolism of *Clostridium botulinum.* This bacterium occurs very commonly in soils, but germination and growth can occur only in a neutral environment (pH very near 7) and in the absence of air or oxygen, i.e. in anaerobic conditions. The toxin inhibits the release of acetyl choline in the nerve synapses, preventing the transmission of nerve impulses which control breathing and many other essential functions. While it is the most poisonous substance known, the toxin is destroyed by heat, and foods containing it can be made safe by boiling.

The bacterial spores, on the other hand, are very resistant to heat. They are ubiquitous, occurring in plants and animals as well as in the soil. For instance the raw vegetables we eat are often contaminated with them. The spores can also occur in hive products, including honey, and (like spores of *Bacillus larvae* that cause AFB) they can survive in honey for very long periods. The spores have been regarded as harmless to man, because the adult digestive tract is too acid for their germination, and the bacterial flora already present provides too much competition for the population to build up and produce toxin.

In California, USA, botulism due to *in vivo* production of toxin* was for the first time suspected, and confirmed, in 1976; this was not in adults but in infants under six months old. In the next three years 50 cases were confirmed in California, and 48 in the rest of the USA.

The human intestinal flora develops after birth; also until six months the digestive system is probably less acid than in adults. So if spores are ingested by a baby they have a greater chance of germinating and producing a population of *C. botulinum* which could form toxin within the digestive system.

However, it is a slow process, and when this form of botulism is recognised in an infant, supportive treatment can be given. As a result, 96 per cent of the babies known to have been infected with *C. botulinum* have recovered, although the mechanism of recovery was obscure.

Babies are given much more limited range of foods than adults, and intensive enquiries were made as to the source of the spores that infected the infants in California. Honey was one of the foods that some of them had eaten, and this caused a great stir in the

bad tempered after the honey flow. Any hive disturbance may set up a robbing syndrome. Commercial queens are readily available.

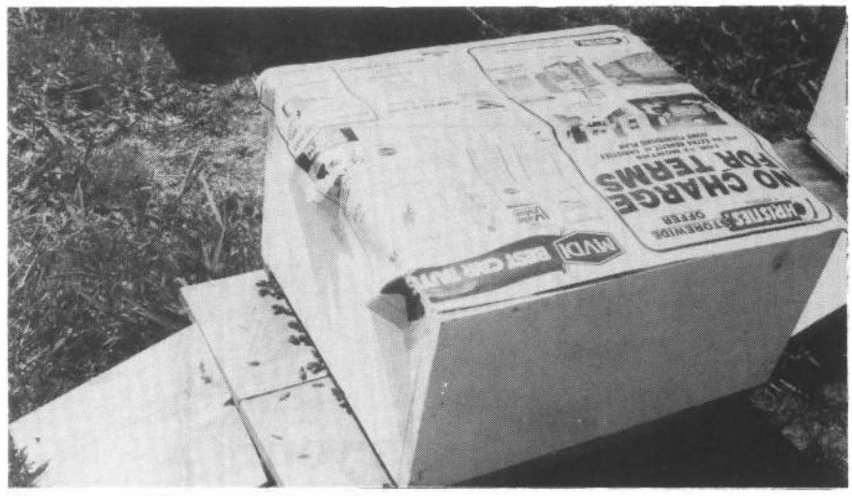
Now none of these need necessarily deter you, but are merely factors that must be taken into account if you decide to go ahead.

These queen-rearing articles should have given you sufficient choice in technique for you to find one that suits you and your operation. I hope so anyway. If any points are obscure or unclear, please write in and say so and we'll do our best to clarify.

I still maintain that the price of bought queens is so reasonable, the receipt and introduction so convenient, the risk of failure so slight, that in spite of commercially-raised queens making the whole business seem a little impersonal, it hardly seems worth the hassle of raising your own, but remember that whatever you choose to do, it must be done each and every year without fail. Otherwise the failure is yours.

There are innumerable variations on queen rearing, but all have as their objective the development and eventual successful introduction of fully grown queens of good strain and this is so whether the queen is "introduced" into the hive in which she is raised, or one completely different, and whatever the reason for requeening, whether it be swarm prevention, strain improvement, increase, or any other reason.

And do realise that any hive used for queen cell raising is out of operation for a minimum of five weeks!



Paper-topped hive ready for uniting.

Graft (in first hive) and punch (in second.) Note Queen right halves behind. Both 'fronts' raised Queen cells, both reunited with paper method quite happily.

adapted from "Bee World"

honey industry of the United States. Investigations include the following statements:

Of 41 cases in California, 12 had recently been fed honey; spores were found in 10 per cent to 15 per cent of honeys tested in California; no spores were found in 17 samples from previously unopened jars; the pH of the honey was between 3.5 and 5.0; spores were found not only in honey in opened jars (which might have become contaminated in many ways) but also in honey in closed jars offered for retail sale, and in bulk honey before it was processed; Among 241 samples of commercial honey from 32 states of the USA, 18 (from 9 states) contained *C. botulinum* spores; the maximum probable number was 7 spores per 25 g honey.

It is clear that honey has not been a major cause of infant botulism. There is little evidence on the presence or absence of spores in the honey eaten by the 12 Californian babies that became infected, but their presence has been established in three cases. No infants affected were older than eight months.

The whole affair raises many problems, and although most of these are unrelated to honey, some beekeepers have become alarmed since honey has become entangled with it, with statements in the press that honey is a possible source of infant botulism. The following are a few of the questions that may be asked.

- Why should the majority of cases be reported in California? Do they occur as widely elsewhere, unrecognised?
- Is infant botulism really a new occurence, or has it existed for many years?
- If it has occurred, unrecognised and untreated, does it have any connection with what are known as cot deaths or crib deaths in babies? Some recent studies on 280 such details in California showed *C. botulinum* in 10 of the babies but none of these 10 had been fed honey.
- Is honey implicated simply because it is a more stable substance than most baby foods, and therefore still available for analysis when other foods have been fully consumed or thrown away?

From the beginning of recorded history, and probably earlier, honey has been given to newborn children as part of the birth rite, in many regions of the world. Three independent studies in different parts of India were published in 1973, and they showed that the majority of newborn children were still fed honey before breast feeding was commenced. It is notable that the reports of infant botulism have come from the USA, a country with very high standards of hygiene.

* known as *toxicoinfection* to distinguish it from poisoning due to ingestion of the *preformed toxin.*

FROM THE COLONIES

FAR NORTH

Far North beekeepers have experienced the wettest year for some 30 years, but most of them report good flows of nectar in February. So the season may yet turn out to be a good one.

The honey section in the Mangonui A and P Show has been resurrected and we look forward to very keen competition in the dozen classes provided.

The club meets regularly and enthusiastically. The most recent field day included an inspection of the president's apiary where members took it in turn to open a hive and explain the what, why and wherefore of a hive. As each hive was different this was most instructive. The last hive opened, being of a darker strain of virile bees, and the more prudent hobbyists retiring earlier for the luncheon recess (picnic style and families included) though it seemed that even the hardiest of the club were putting that last hive together with ever-increasing zeal!

After lunch the club moved to Mr Wade Rogers' property where Mr Fred Panther met the members and showed us plantations of eucalypt trees that he and his father had planted 35 to 65 years previously, describing their timber qualities and their value as nectar sources in sparse flora periods. These sparse periods seem to be increasing as the land is utilised more for pastures. Nectar-bearing eucalypts are one means of filling this gap. The club is most grateful to Mr Fred Panther for his time, patience and wide knowledge and expertise.

Guy Macpherson

OTAGO

This is the last day of January and we might as well be realistic, the clover is running towards the end of its flowering period. There is still a good showing in some places and red clover is coming on, also catsear and thistle. But we can safely say that for most of us here south of Dunedin it will again be a mediocre crop. We did have a good start and then a break in the weather just after Christmas, some very good days round about New Year. Again round about January 10 to 13. Then rain and rain and cold conditions for a fortnight. Just not funny, you will have heard about the floods. The last few days are beautiful summer, very warm. But a bit too late for most places in Otago and Southland.

A more optimistic note comes from Central where some of our brother beekeepers are doing just fine. Viper bugloss is tops this year and great displays of its blue flowers can be seen. I heard that some chaps are expecting 10 to 12 tonnes per 100 hives. Mr Muldoon will be pleased! Perhaps it can be forked out again to those unfortunate ones who lost hives in the floods which should occur only once each century. (Twice in 18 months.)

Crime has come to beekeeping lately, not only up North as I heard last winter, but also here in good old Otago. Some nucs have gone missing and some hives have been cleaned out. Meaning that combs and bees have been removed but supers and lids and bottoms have been left. Pretty cunning and done by someone who is pretty confident in handling hives. It has been reported to the police but it will be very hard to catch the thief as hardly any gear has been marked up to now, certainly not the frames.

The branch plans to hold a field day at Waitahuna on the first Saturday in March.

John Heineman,
Milton.

WEST COAST (S.I.)

The outstanding event of the season to date was the field day at Glosson's apiaries, Blackball. There were visitors from Christchurch, Nelson and Westport. The most distant travelling member would have been our president from south of Franz Josef, over 130 miles.

Again those responsible for selecting the day picked a perfect one against all odds and Alan Braid declared the day open and handed over to John Glasson who welcomed all to their establishment and led a procession on an inspection of the various buildings as a starter to the day's proceedings. There was the extracting house with large twin radial extractors and the packing house to which the honey is pumped from the extractors and the "super" house for storage of supers. There was a shed for the storage of rendered wax.

The apiary advisor spoke on energy conservation. Some of his suggestions were that more use be made of solar heating for water, especially the rendering of cappings, and scrapings in areas where the sun shone enough to make this practicable and to not use too heavy a foot on the accelerator.

Keith Detlaff showed, and pointed out the defects of a commercially-made poorly-designed drip tray and feeder combined. He also demonstrated a plastic section box and foundation that bees work. When filled the unit can be sold, and used on the table as is.

A gadget for frame nailing was shown and Alan Braid's brand for supers that attaches to and is heated by a fuel operated soldering iron.

The apiary advisor showed four litre plastic feeders. Also shown was an interesting electrically heated gadget for keeping wax liquid for sealing foundation to frames.

The simplest thing shown was a clamp that attached itself to a 44-gallon drum when used in conjunction with a front end loader. Kevin Ecroyd gave a talk on his overseas trip in the honey producing and buying areas of the Peace River and Europe.

Mr Little gave a talk on N.B.A. matters and Jasper Bray on the H.M.A.

Not only did Glasson's turn on a perfect day but also hospitality that matched it. To do it justice there was the best attendance ever and to make sure it was a beekeepers do, two swarms of bees arrived to interupt Kevin Ecroyd's talk, and, judging by the interest taken in them one could have been excused for thinking that no one had seen a swarm before.

* * *

Heavy rains about Christmas caused damage, loss and consternation to some beekeepers. Rod Bucanan had one apiary buried under a slip and Basil Detlaff lost all but three hives out of 27 in one yard. They were swept away in flood waters, and another yard had several hives washed over but not lost.

Another of his yards was isolated when the road bridge giving access to it washed away. As there was no likelihood of access being restored in the forseeable future, the hives were lifted out by chopper, three hives at a time. Perhaps not the cheapest transport, but the only means under the circumstances.

* * *

The season has been unpredictable, but if the weather permits there should be a good crop of rata honey. Rata

trees are flowering well, and white rata vine is early and prolific and the red vine just showing.

Peter Lucas,
Hari Hari.

Field day folk outside Glassons' honeyhouse.
Mr and Mrs Glasson snr on left. Mrs Lucas fifth from right.

WAIKATO

Well, much rain has come down out of the sky since I last wrote in early November, and it is now early February, the last 10 days being the only spell of settled weather we have experienced this season. Before this we had a deluge which lasted two weeks nearly non-stop, but it is over now, and so is the season. During this period some of the best clover bloom I have ever seen was there, but alas, the rain.

As with most wet springs nosema was very bad. Hives that were two boxes of brood in early November reduced to one box by the end. Instead of going up into the supers the bees filled their brood chambers and reduced brood rearing even further.

Despite a heavy flowering, rewa rewa yielded nothing, while Tawari flowered much lighter than expected, and weather reduced the chance of a crop still further. Buttercup which looked so good yielded very little for the amount of flower. Clover has flowered very well, the best I have seen, and yielded well in Rotorua-Taupo, where hives that had broom to build up on have done very well and some good crops obtained, but in the Waikato some areas have very poor crops.

Disappearing queens was bad again this spring, especially introduced queens. Those mated in divisions at the apiaries gave little problem.

Was the cause nosema, or are breeders trying to mate too many queens for the drones available? We have spread our baby nucs over a much greater area the last two years with much better results, and less loss a month after introduction.

Ragwort, pennyroyal and thistle are all flowering well so some more could be gathered, but may be only fit for feed

Cliff Bird

Twenty five percent more honey or how to afford a Cadillac

by Murray Reid, Apicultural Advisory Officer, Ministry of Agriculture and Fisheries, Hamilton

DR RINDERER and other scientists working at bee breeding laboratories in the USA are looking for the "125 per cent" bee! In the search for better and quicker methods of analysing the honey producing potential of selected queen lines, scientists have tried to move their operations indoors. This removes some of the field problems of bad weather and poor honey seasons.

Between 50 and 80 worker bees are placed in a cage with a small piece of wax comb. The cages are kept in controlled conditions in an incubator. They feed the bees sugar syrup, measuring how quickly the bees take measured quantities of syrup out of tiny feeders.

Some bees take the syrup more readily than others and this trait holds true under field conditions as well. It appears that the ability to take sugar syrup rapidly from a feeder under caged conditions is a good measure of the ability of the colony to gather honey in the field.

This is a very exciting development as evaluating selected lines of bees has hampered genetic improvement of the honey bee. We have long been able to develop queen lines by artificial insemination or careful natural mating in the open, but it's difficult to judge the value of such lines because we can't evaluate a queen direct. We have to evaluate her progeny, i.e. the workers.

While conducting these hoarding behaviour trials, Rinderer and his colleagues found that bees with the greatest area of comb available to them in cages, also stored the most syrup.

This result also applied to hives maintained under field conditions. In all cases there was surplus comb room still available for sugar syrup (caged conditions) or nectar (field conditions). Thus, differences did not occur as a result of a lack of storage space in those colonies receiving fewer pieces of comb or supers.

If the bees don't have an excess of comb storage, they cram the brood nest with nectar and honey and restrict the area in which the queen can lay. They are not stimulated to forage so vigorously for nectar either. It seems it is this excess storage space that stimulates the scout bees to go out and find nectar sources.

Empty combs may also make field bees more receptive to the recruiting dances performed by the scouts on their return. So the scientists say, if you want 25 per cent more honey, then crowd the bees as much as possible before the honey flow then give them two honey boxes instead of one.

They accept that this crowding may not always be possible, especially in areas with long flows such as Northland and the Waikato, where boxes are needed early to catch any surplus off the willow, barberry or buttercup. Crowding bees for too long under such conditions restricts the queen and no doubt contributes to swarming.

Perhaps this concept works best (as in the trial area) where the honey flow is relatively short and very intense when it comes, such as areas in Canterbury and Southland.

A group of six enterprising Canadian beekeepers in Nipawin, Saskatchewan have gone one better. They put out four honey boxes on their first round just before, or as, the main nectar flow commences. Then the fun and games begin as they work very long hours hauling back the part filled boxes for extracting, and there's their secret. They only allow the bees to partly fill the boxes. They remove them before the bees have fully ripened the honey and begun to cap the cells over with wax capping. They reason that this wax is very expensive to produce; the bees use about 8 kg of honey to produce 1 kg of wax. They also use honey as energy to evaporate that last bit of water from about 20-22 per cent moisture, when the boxes are removed, to 16-17.5 per cent when it is fully ripened and capped over.

Honey of 20-22 per cent moisture won't keep of course, so these beekeepers get rid of this extra moisture in their warming rooms. Here the honey is warmed to assist in the extracting process, and the moisture is removed by using banks of 10-12 household dehumidifiers.

In the extracting room life is a lot easier for all concerned. These half filled boxes are a lot lighter and weigh maybe 20-25 kg instead of 30-40 kg.

This means female labour can, and is, used extensively in the Canadian extracting plants. This is a trend New Zealand beekeepers could well follow!

Bee fodder as far as the eye can see. Volunteer sweet clover over 2m tall.

Separating the honey from the wax cappings can be a laborious and expensive chore. With little or no cappings the Nipawin beekeepers don't have this problem any more. They have little wax to sell now, but that doesn't worry them as they have so much more honey to compensate.

Once extracted the boxes, still sticky with wet honey, go straight back onto the hives. These "sticky boxes" act as a further stimulant to the bees to collect more nectar. These Nipawin beekeepers would visit each of their apiaries to take honey on a seven to 10 day cycle. So each apiary would be visited four to five times in a season. Many of our beekeepers by contrast, only visit their apiaries to remove honey once or twice.

There is no reason why we can't follow their example and produce another 25 to 30 per cent more honey. We'd have to change many things of course. We would need larger extracting premises that can handle pallets. We would need a factory staff of four to five people and work the plant six days a week. The Nipawin beekeepers were all averaging about 350 to 450 supers a day through their extracting plants.

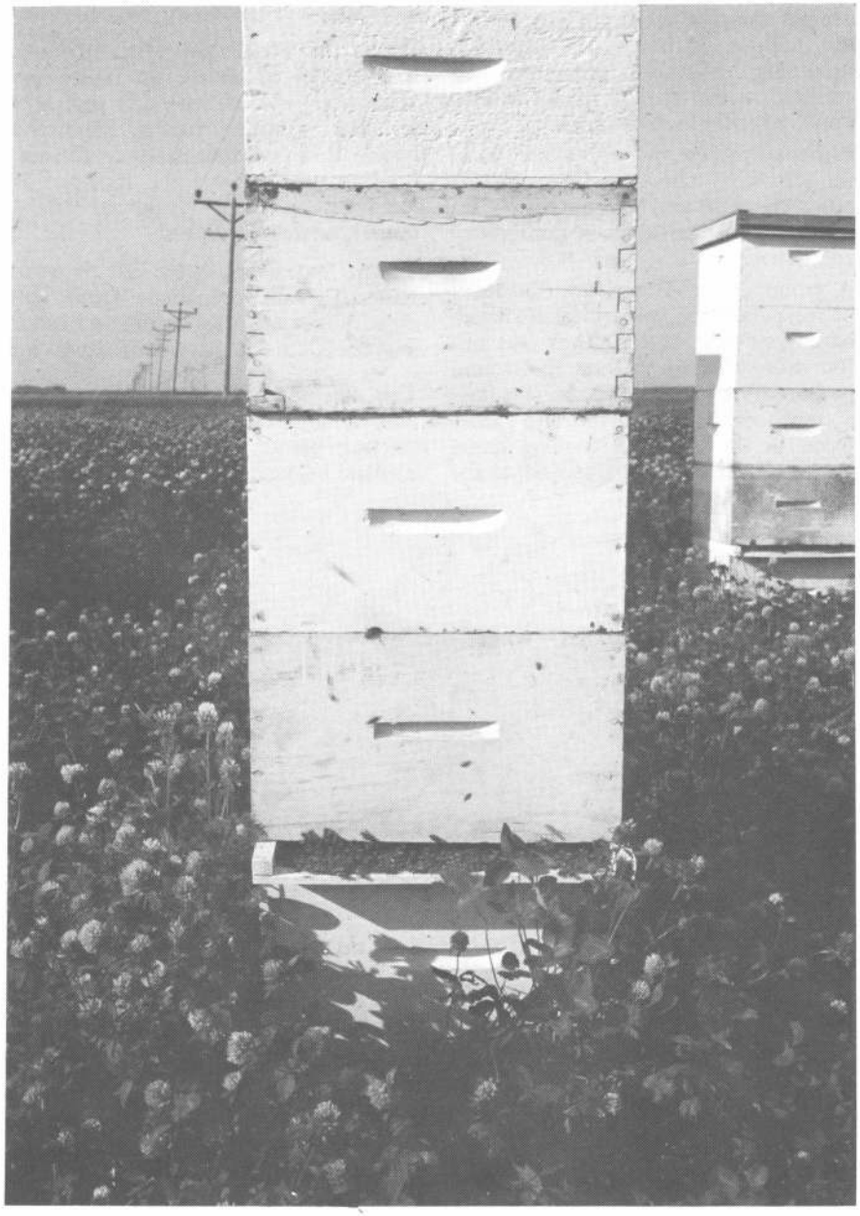
We would also need a field crew of up to six men and two trucks at least. We would have to bring many of our apiaries closer to home base too, to cut down on long trips. Time spent driving a truck is basically unproductive after all.

When taking off honey in the field it is the two boxes immediately above the brood nest that are removed. This means lifting two boxes to get at the honey. The new sticky wets are placed on the very top, usually the fifth or sixth position. It's not much fun lifting boxes this high even if they are only partially filled. So some of the Nipawin group are moving into shallows or three quarter depth honey boxes.

The secret of the whole operation is a rapid turn around of the honey boxes. We could do it but beekeepers would need quite a change in mental attitude. Many of us don't like employing staff or can't find sufficient staff in the first place. And our nectar flow patterns may not be quite as intense as in parts of Canada.

These Nipawin beekeepers operate in extensive seed cropping areas and they don't have the heavy stocking pressures their New Zealand counterparts have to compete with.

Perhaps the best argument to consider and perhaps try this system was expressed to me by Dr Don Peer, one of the leaders in the "Group of Six" at Nipawin. "Next time" he said, "you see a Cadillac or Lincoln Continental going down the road, you could own that if you'd produced a third more honey than usual!"



Hives stacked up on red clover.

Some references:

MILNE, C.P. Jnr. 1977. An improved laboratory measurement of hoarding behaviour in the honey bee. American Bee Journal 118(8): 502-507.

RINDERER, T.E., BAXTER, J.R. et al. 1979. Empty comb stimulates honey production. American Bee Journal 119(1): 40-43.

Cell raising and mating colonies

Some questions answered by CHRIS DAWSON

"QUEEN CELL raising" and "Queen mating colonies" are popular subjects with beekeepers at meetings and field days.

The two articles that have appeared in this magazine have also been given as lectures and always promote healthy question and answer sessions. My thanks to those who have asked questions and I hope these answers are helpful.

Special equipment

• *Your systems of cell raising and mating colonies require special equipment. This has its disadvantages. Can the systems be adapted to standard gear?*

The method of raising cells in queen-right colonies can be successful with ordinary standard size fine bodies and frames, but it is not as efficient as it requires more bees per cell raised.

The minimum-sized mating colony using standard gear would be three full size frames housed in a four-frame nuc box. This would need more than twice the number of bees that the variable nuclei hire would use.

May I suggest that you try out the systems by building six "variable nuc boxes and 150 frames. These, if carefully managed, would, in one season, yield 100 queens. The cost of the six nucs and 150 frames would be more than saved in less than one season.

Raising queens is just as much a special operation that requires its own equipment as extracting honey or moving hives.

Pollen feeding

• *How do you feed pollen to the cell raising colony and why?*

The queen cells are built of wax and pollen and the grub is fed on royal jelly which is made from nectar, pollen and water. If loose pollen and feed syrup is placed on the frames immediately above the cells, the nurse bees have ready access to everything they need to build the cells and feed the grubs.

Pollen is first sieved through a wire gauze mesh that is small enough to just break up the pollen granules. The bees will use the pollen in this form but, if it is mixed with icing sugar or raw sugar, they will give it a warm welcome. The powdered pollen is placed on a piece of paper on top of the frames close to the feed syrup.

Royal jelly

• *Many questions are asked about royal jelly. Its collection, preservation, reconstitution and use.*

Collection – Royal jelly is harvested from queen cells that are not sealed. The opening is made larger and with the pointed end of the royal jelly spade, the grub is lifted out. With the spade end, the royal jelly is transferred to a small container. A plastic cell cup is suitable for this.

Preservation – If placed in a small air-tight container in a deep freeze, royal jelly can be kept indefinitely. It can also be dried.

If the small container is placed on a window ledge in the sun, the royal jelly dries until it is just a skin on the inside of the container. In this form it can be kept indefinitely.

Reconstitution – On the day that I expect to use royal jelly, I fill the container of dried royal jelly with rain water and place it on a window ledge in the sun. In about three hours, the jelly has gained its original consistency.

If there is surplus water, it is shaken off and the balance mixed with a small brush to the correct creamy consistency. If it is too thick, water is added one drop at a time.

Use – The question is often asked – Must royal jelly be used in grafting? Some of the experts graft into dry cells and some use water or honey, but my best results are obtained on royal jelly. A dot the size of a pin-head is placed on the floor of the cell and ON this (not IN it) is placed the grub by using the 00 or 000 sable brush. This brush will cost $3 or more but it is worth it.

My answer, therefore, is that while royal jelly is not absolutely essential, it does make it easier for the less experienced to secure good acceptance of cells.

Cell acceptance

• *How can you tell if a cell has been "accepted"?*

As soon as the grafted cells are placed in the cell raising colony, the bees start working on them. About 20 hours after receiving them, they have either started to lengthen the edges of the cells or cleaned them out. An "accepted" cell will have a border about one eighth of an inch built around the lip while a rejected cell will be quite clean.

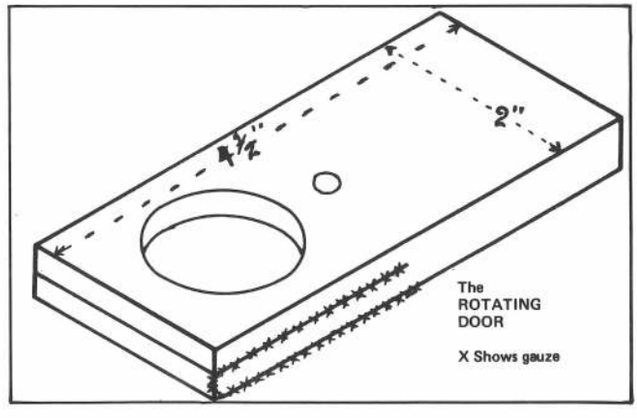
Breed improvement

• *Is it possible to improve your own*

CORRECTION

THE ARTICLE on Queen Rearing Colonies in the December, 1979 issue of this magazine has an error which could cause difficulty to anybody making the rotating door. In the third to last line the measurement of the length of the door should be 4½ inches (four and a half inches) not 4 inches as stated. My apologies for this mistake.

Chris Dawson



breed of bee without bringing in other breeding stock?

This questioner raises a very thought-provoking topic which prompts the inquiry: What "improvements" are sought? Some beekeepers have discovered that, when they introduced bees of another area, their own bees deteriorated in performance.

Because their own bees had become acclimatised to the conditions of that area, the improvements they wanted had to be sought in their own bees.

The answer, therefore, is that it is possible to change any breed of bee and sometimes quite dramatic changes can be achieved in a few generations: It is necessary for the beekeeper to set his goals of desirable qualities and by selecting the colonies that have a tendency towards those qualities for breeding purposes he can work towards and secure a change in his breed of bee. He will be hoping that the change is an improvement.

Every breeder of living things wants to reach certain standards and towards this end he selects the desirable qualities that he aims to breed into his stock. The beekeeper uses selective breeding of the one side of his stock to work towards his goal of desirable characteristics.

The five desirable qualities that are in the writers aim are:

Crop gathering vitality, low swarming tendency, calm behaviour on the comb, disinclination to sting, correct colour.

It is a good idea to keep an ever watchful eye open for the colony that shows the desirable qualities. If it is used for breeding, it could make improvements.

Today, I had the pleasure of a call from a friend who requeened with my queens in the highlands of Papua New Guinea. He told of the change in one generation from vile tempered stock to bees that he was able to work without protective clothing. These bees will revert to bad tempered stock unless the beekeeper does some selective breeding.

Grafting room

• *Is a grafting room absolutely necessary?*

The value of a grafting room is in its control of atmosphere, the availability of tools and accessories needed and ready access to breeding colonies inside. Many cells have been successfully grafted out in the open with the container of jelly and grafting tools on top of a fence post while the next post has been used to steady the frame being grafted from.

One queen breeder does all his grafting at night under electric light as he can control the atmosphere quite easily and the breeding colonies are usually calm at night:

I have seen Ian Berry sitting on a hive out in the open while grafting his cells. It is interesting, also, to note that he does his grafting with a piece of wire. He is an expert.

Sharing a secret

In the article on "Cell Raising in Queenright Colonies", the use of a plastic strip over part of the queen excluder was described.

Now let me share a secret.

While discussing the system with Mervyn Cloake who uses a similar system, I told him that I did not use the plastic strip after the first lot of cells had been raised because the bees did not need it. His immediate reply was "Neither do I!"

If the cell raising colony is built correctly the first time and the cell building fever has been effectively induced, the plastic strip need not be used after the first two or three days. Once the queenright cell raising colony has been established it can be used right through until the autumn without using the isolating strip.

If the colony begins to refuse to accept cells, insert the plastic strip once more and the colony will return to work again.

Coping with children

by David Williams

THERE IS nothing pleasanter, nor more rewarding, than demonstrating the facts of beekeeping to a group of children. It has its dangers, of course, but these can be minimised.

The visit should be planned in advance, naturally, and can only really take place in spring, on a fine day, with the barometer rising.

Hives, or a hive, should be prepared the day before. It is useful to:–

- Do a full examination, thus ensuring that all frames are loose
- Locate the queen so that she will be more or less in the same area on the morrow
- If the bees are in two boxes, add a third and raise up into a central position in it a frame containing eggs and larvae
- Other frames may be blank. Feed well to bring them into good temper.

That prepares the hive ahead of time. When the group arrives, it is often best to have frames in various stages from freshly wired foundation to thick, dark ones, together with a sheet of foundation that they can examine for themselves (and often break).

It is sometimes possible to show nailing, wiring and foundation insertion but this is usually only possible, or worthwhile, for small groups of older pupils.

The hive may then be explained in terms of frames and boxes, and management and rearrangement sequences quickly touched upon before lighting the smoker, donning the veil, showing the gloves and hive tool, and proceeding to the practical part of the visit.

Never spend too long on any one aspect. Children get quickly bored, especially in a crowd, and it is best to keep them moving, dealing with things fairly superficially until the hive itself is demonstrated.

Raising a brood frame to the third stage is a useful experience. It means that a frame containing most of the features to be demonstrated is readily available.

The frame should be a new one, light coloured so that the eggs and larvae are more easily seen, and may well contain honey and pollen, perhaps both drone and worker comb. Certainly the onlookers will be fascinated at being able to peer down into the cells after the frame has been lifted and adhering bees shaken at the entrance.

All these features help to build up a more complete picture of the activities of hive and hive keeper.

The production of this frame as soon as the hive is open focusses the visitor's attention from the first, and after this they are usually quite prepared to sit back for a short time and watch as the operator proceeds into the bowels of the hive.

It might be timely to list arrangements for viewing here. Classes may be of thirty or so pupils. With that many children, it is best to carry out preliminary instruction well away from the hives and in a position where the whole group may gather round.

At the hive itself, it is possible for most of the pupils to be behind or alongside the hive while it is smoked and the first frame lifted out. The bees may be subdued enough for pupils to actually look down between the frames and see the masses of bees below. They must be warned:

- Not to walk in front of the hive
- Not to touch the hive in any way and especially not to jar it
- Not to make any sudden movements or to strike at any bee even if it settles on them
- To obey all orders instantly and quietly.

After this preliminary glimpse, they may be led carefully to a position eight to ten metres in front of the hive and made to sit down. They are then in a position where they may see everything that is going on, but are away from operations and below the bee's flight path. Anything they need to see close-up is brought to them.

Suitable frames may now be lifted out to demonstrate drones, workers and, when located, the queen, and such frames may be carried round the group and returned to the hive one by one. Bees on a frame rarely fly and if they do, tend to return to the hive as long as all handling is done gently and the children told to remain quiet and slow-moving, even in their enthusiasm.

The hive having been demonstrated, it is then easy to round off with a quick summary of what they have seen and its significance before moving on to extracting equipment and storage facilities, with perhaps a taste of honey or a fragment of cappings to chew as a bonus.

Then they go away happy and you can breathe a sigh of relief that things went well and the bees behaved themselves. And that's all there is to it.

Once the news gets around that you keep bees, are within walking distance of a school and do not mind demonstrating, and those watching do NOT get stung, you will be inundated with requests.

Luckily the activity is self-restricting. The weather is a limiting factor, only a certain number can gather round a beehive at any one time, schools may smile on one visit but frown on a series of interruptions to routine, and so on. It all balances out quite nicely.

You perform a public service, the children get the facts on beekeeping and are henceforth favourably inclined to bees, the teachers complete another project with a field excursion, and the demonstrator usually receives the most charming vote of thanks from some junior spokeswomen.

However, suppose the worst comes to the worst and some onlooker does receive a sting. Order everyone back, scrape out the sting, apply a cloth soaked in hot water as hot as the skin can stand, constantly re-heated and re-applied for some minutes, apologise all round and explain the facts of stinging to the group – that stinging is a defence mechanism, that the bee sacrifices itself for the sake of the hive, that bees prefer not to sting, and that the swelling will soon go down. Children are remarkably tough and many of them can be stung without over-reacting. It is usually the parents who do that!

But it is still better to avoid than to explain.

See-through demonstration hives will be dealt with in a future article.

The First Maori book about Bees and Beekeeping

by Chris Dawson

THIS MANUAL for Maori beekeepers shows the concern that Rev William Charles Cotton had for the welfare of the people whom he came to serve.

His famous "My Bee Book" was published in Great Britain just about the time he left that country for New Zealand. His "Manual for New Zealand Beekeepers" was published in 1848 in New Zealand.

The Maori Manual for New Zealand beekeepers titled "KO NGA PI" was published in 1849.

Production of this booklet was probably because Cotton was in charge of St John's College and the imprint on the title page shows that the booklet of 21 pages was printed at St John's Press. It is possible that he did not see the book through the press as he returned to England at the end of 1847.

The cover page and the first page of text show the familiar Cotton use of words to teach as simply as possible the information he wishes to give.

It is interesting to note that he believed he was the first to introduce bees to New Zealand and that he succeeded in bringing one hive only. Apparently he did not know that Mary Bumby had brought two hives five years previously.

For the translation of the Maori text to English, we are indebted to John Brooking of Timaru.

It is believed that the copy of "KO NGA PI" in the Alexander Turnbull Library is the only one in existence and I just happened to find it while doing some research into the earliest samples of New Zealand printing.

KO

NGA PI;

ME

NGA TIKANGA MO TE TIAKI I A RATOU,

MO TE MAHINGA I TO RATOU HONI,

I TA RATOU WARE.

PRINTED AT ST. JOHN'S COLLEGE PRESS.

1849.

KO NGA PI.

No namata tenei kai te honi. He hanga hua noa iho ki Kanaana. No reira te kupu nei, "He whenua e rerengia ana e te waiu e te honi." He kai reka rawa hoki. No reira taua kupu i nga Waiata, "Reka atu i te honi me te honikoma." Ko te kai hoki tenei a Hoani kai iriiri i te koraha.

He mea pai rawa te honi hei kinaki kai, hei hoko, hei rongoa wharo.

He ngaro te pi. He hunga noho huihui. Tekau nga mano—, e wha tekau nga mano i roto i te whare kotahi. He hanga hoki e hohoro rawa ana te hua. I tenei tau 1847 ka wha nga tau o te Pi ki Nuitireni; Kotahi ano hoki te pokai i kawea mai: na kua whiwhi noa ake nga tini pakeha ki ana Pi ki ana Pi.

I mua i roto i nga puta rakau o ratou noho-anga. Na te tangata ratou i mea kia noho ki roto ki te whare. Ki te kahore ratou e tia-kina, ka whati noa atu, ka mate ranei.

THE BEES

The ways of looking after them, the making of their honey, and their house.

Honey is the food of the baby bee.

The Kanaana (unknown . . .) here is a starting place for breeding. That's why these words are here "A land of flowering honey and the things they have to do to preserve honey in their storehouse."

A food that is very sweet. That's why the words in these songs are "Sweeter than honey and the honeycomb." This is the food of John which he can get in the surrounding area.

Honey is very good for the following reasons, to complement food, to sell, or for medicine.

The bee cannot survive on its own. They gather together. Tens of thousands, actually forty thousand, live in one house. They breed very easily.

In the year 1847 the bee had been in New Zealand four years; one hive only was brought here. From that one hive a lot of pakehas have got bees upon bees.

They're busy moving about inside, outside and in and out of the trees where they live. It is man that made them live inside the built house. If they're not looked after the hive will break up or the hive will die.

—Translated by John Brooking of Timaru

How were bees brought to New Zealand?

by Chris Dawson

THE TRANSPORT of bees from one corner of the world to any other corner in these days of jet travel is no problem when the difficulties of permits and filling in of forms have been overcome.

But to safely transport bees in the hold of a sailing ship on a journey that could take half a year is another matter.

Mary Anna Bumby, when she travelled to New Zealand, was on the way for 173 days – (5½ months) and she succeeded in transporting two colonies safely.

Other accounts of the safe arrival of bees to other parts of New Zealand during that decade – 1839-49 – are recorded, but nobody thought to record just how this remarkable feat was accomplished.

William Charles Cotton in his "My Bee Book" published in 1848 describes several methods by which he hoped to pack his precious cargo for transport to New Zealand and he records that he was able to safely land one colony.

The pages 355 to 364 from Cotton's "My Bee Book" make interesting reading and probably contain a clue as to how he succeeded.

It would appear that Cotton's bees travelled on the same ship as Bishop Selwyn, the first Bishop of New Zealand.

"ONE FACT HAS NOT, TO MY KNOWLEDGE, BEEN MENTIONED. THE FLOWERS OF THE PLANTS ABOUND WITH HONEY, WHICH THE NATIVES FREQUENTLY SUCK. THUS, SHOULD BEES BE INTRODUCED INTO NEW ZEALAND, AND I SEE NO REASON WHY THEY SHOULD NOT, THEY WILL FIND ABUNDANCE OF FOOD IN THE FLOWER OF THE PHORMIUM TENAX, AS WELL AS IN OTHERS. I MENTION THIS, IN CASE ANY ONE SHOULD BE DISPOSED TO TAKE BEES AS AN EXPERIMENT."—*Honourable Henry William Petre on the Settlements of the New Zealand Company*, p. 69.

IT seems to me that this is a lucky guess, which would entitle the clever writer of the book from which it is taken, to a pro-

phetic mantle, at least as stately as that of old Merlin. And how do I know that it will turn out as true as, or rather more true, than any of the far-famed Welshman's prophecies? Just for this good reason—because I myself intend to have a good try at bringing it to pass. I hope many a busy Bee will

"Gather honey all the day
From every opening flower"

of Phormium tenax in New Zealand. There is enough and to spare, for Bees as well as men; so these new flower-suckers will not, if they get safe to New Zealand, which I trust they will, deprive one single man, who has the best right to all that is good in his native land, of the *sweet* occupation of sucking the Phormium tenax, or any other of the unnumbered and unnamed flowers. The Bees will do more effectually for them with their small proboscis what the natives now do for themselves with their large mouths. I hope a Bee will never be killed in New Zealand, for I shall start the native Bee keeper on the no killing way, and when they have learned to be kind to them, they will learn to be more kind one to another.

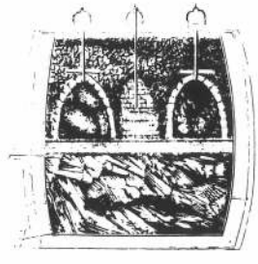
"To Bee or not to Bee—that is the question"—as Hamlet would have said, if he had been sensible enough to calm his wounded spirit by *taking* to Bee-keeping, instead of *taking* the poisoned foil. A Bee's sting is as sharp as any unbuttoned foil; but, as I said in my first Letter, the pain of a sting is a mere nothing, and the swelling goes off in a day. Bee keeping is a good thing to calm a sorrowful heart, so I think I can solve this question better than he did. In a former article of this Work, *you* have seen my notions—no dreamy ones, I believe,—of the way in which Bees may be put to sleep in winter. How those who are thus treated come out ready for harder work in the spring, than their fellows of other Hives, who have not enjoyed this state of hybernation—this state of what we may call true collegiate repose:—I call it collegiate repose, because they are all *collected* together at the *head* of the *Hives*. You have also seen, that the most intense

degree of cold, if it be not accompanied with moisture, is highly conducive to the health of Bees in winter. Such was Mr. Murphy's winter—such is every winter in Siberia. Now, more useful things are found out, by combining the knowledge of others than by presumptuously keeping ourselves perpetually on the stretch to start something new of our own. The world would never get on in this way if all men were so proud-spirited as this. As a disciple in the school of others, and above all, in the school which the schoolmistress Bee keeps for all who will learn of her, I believe that I may be able to confer on the natives of New Zealand the pleasure and the profits of Bees of their own.

The Bee of England, like the man of England, if he be but good of his kind, is, I think, surpassed by none in the world. I will not get Bees from India—nor Bees from South America—nor Bees from New Holland, but carry them direct from England, sixteen thousand miles over the sea. How is this to be done?—By putting them to sleep, by keeping them at a low temperature, by burying them, and keeping them dry. Ice has, I know, been carried from North America to Calcutta, in which passage it had to cross the line twice. It was taken for the purpose of packing fresh salmon:—it was not considered as a valuable part of the cargo; and yet, when it arrived at port, it sold for much more than the salmon which it preserved. Fresh salmon is not a necessary in India: ice is nearly so. The waste was, I believe, not great, and what melted was pumped out of the ship from time to time, together with the common leakage. The only care that was taken of this extraordinary cargo, was to keep the hatches closed and battened down, that the change of temperature might not affect the contents of the hold. The success of this scheme was entirely owing to the property of ice, in virtue of which, it conducts heat so slowly.

Now here is a diagram, showing, more clearly than I can do in words, the mode in which I intend to carry Bees to New Zealand; that is, to the furthest point of the globe. At all

events, I will try: I will take care that my Bees shall send word to their relations in England how they fare. They will have put a girdle round the world, though not in the space of a minute, as the faithful Ariel did—Bees surely are aërial creatures, though not of super-Bee power. I shall be fully satisfied if they arrive safely at New Zealand in five months, or even a little more.



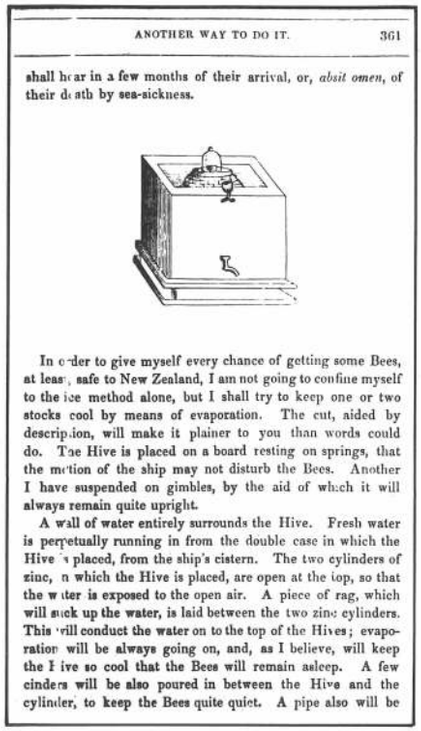
The diagram is a vertical section of an old hogshead, which I have had fresh coopered, and the joints properly fitted. It is lined throughout with a coating of thick felt, which is, I believe, one of the best non-conducting things. The bottom has a pipe and tap to carry off the leakage, and is filled with broken crocks, that the drainage may be most perfect.—N. B. always fill your garden-pots with such crocks as these.—Plants, Bees, and Men all like to have their feet kept dry.—Man is often an ungrateful animal—but ingratitude is not the fault of Plants or Bees. The Plants will repay a gardener for his care by their healthy state:—the Bees, I trust, will

repay me by voyaging safe to New Zealand—Man alone gives a grumble or hard look to the kind doctor who tells him to keep his feet dry, and his head cool, if he wishes to be well; I wish he would take a lesson from the Bees or the plants. They both teach the same, as do all the sinless works of God.

Now then to return to my Bees from this little side-path, in which, I trust, you have not been wearied;—if you have, let the prospect of some New Zealand honey revive you. As the ice melts away—as melt it will—though I trust two-thirds of it will safely cross the Line, I shall draw it off through the tap, and by measuring the waste every day, know how much I have left. When old Neptune comes on board to inquire the nature of our cargo,—of a surety the old marine *Ditty*, as I have heard him called, will, with his spouse, Mrs. Amphytrite, be strangely surprised to hear that we have a hundred thousand passengers on board—which is about the crew which will be shipped in ten Hives. Such a crew he never, I am sure, dreamt of before—and I should not wonder to see him fly across the sea in his watery car, when he hears that each and all of them are armed with a poisonous dart, far more piercing than his own trident. Now, without some care we should have a pretty mess of half-melted ice—Virgil would have called it *tabes*, if he had thought of carrying Bees to the undiscovered parts of the earth, where he says the sun is hotter than a fiery furnace—we should have had a pretty mess of this "tabes," together with dead Bees and spoilt honey, if the Hives had been permitted to rest on the ice, and sink down with it as it melted. I have thought of this: and the same diagram represents a wooden frame, which is fixed firmly across the inside of the hogshead, about an inch above the ice. The Bees will be moved from their bottom boards on some cold November day, and securely tied, each in a square cloth of dairy canvass. The Hives will then be placed on the top of this frame, and well dried cinders, from which the moisture has been all baked out, will be poured in from above, till the hogshead is quite filled. By these means light and heat

will be both excluded, and the Bees will be put into a deep and long sleep; though I hope not an eternal one. But some one who doubts my success may say, "Your Bees will be stifled; they can get no air, and air is necessary to their life." I do not think so. A friend has written to me about some Bees which were buried last winter, and were not supplied with any air, but that which *was drained*, you may say, into them through the earth; and they, without air, lived passing well, exempt from all those evils to which unburied Bees are heirs to in the winter.* But in order to give my Bees every chance of a long life and a happy one, as well as of a long voyage;—that I may not have the pain of seeing their carcasses dug out of the cinders on the shores of New Zealand, instead of having the joy of hearing their merry thankful hum as I remove the load which has so long lain heavy on them, when the balmy breezes of New Zealand, loaded with the scent of flowers long unvisited, and of fresh honey long untasted gradually wakes them, softly from their sleep;—that this pleasure rather than that pain may be mine, I have planned, what you will consider, as he of Halicarnassus would have called it, σοφὸν εὕρημα. Each Hive has a pipe leading from the outward air to its T hole;—this will supply fresh air. But you well know, that you cannot put any thing into a full bottle, except you first take something out. So I must remove the foul air before I can put any fresh in. How then is it to be got rid of? Why, by a pipe to be sure, leading also into the outer air, but, as well as the other, guarded by a piece of perforated zinc, that the foul air may pass out without allowing one single Bee to accompany it. This will carry away all dampness, as well as foul air; the Bees' breath may be condensed in an inverted bell glass, as described in p. 85, First Tract. It will then trickle down in the shape of water, just as the Bee-breath did in a long icicle from my Hive in the severe frost of 1838. Thus, I trust, my Bees will arrive safely at New Zealand; and their friends

* See Winter Quarters, page 86.



ANOTHER WAY TO DO IT. 361

shall hear in a few months of their arrival, or, *absit omen*, of their death by sea-sickness.

In order to give myself every chance of getting some Bees, at least, safe to New Zealand, I am not going to confine myself to the ice method alone, but I shall try to keep one or two stocks cool by means of evaporation. The cut, aided by description, will make it plainer to you than words could do. The Hive is placed on a board resting on springs, that the motion of the ship may not disturb the Bees. Another I have suspended on gimbles, by the aid of which it will always remain quite upright.

A wall of water entirely surrounds the Hive. Fresh water is perpetually running in from the double case in which the Hive is placed, from the ship's cistern. The two cylinders of zinc, in which the Hive is placed, are open at the top, so that the water is exposed to the open air. A piece of rag, which will suck up the water, is laid between the two zinc cylinders. This will conduct the water on to the top of the Hives; evaporation will be always going on, and, as I believe, will keep the Hive so cool that the Bees will remain asleep. A few cinders will be also poured in between the Hive and the cylinder, to keep the Bees quite quiet. A pipe also will be

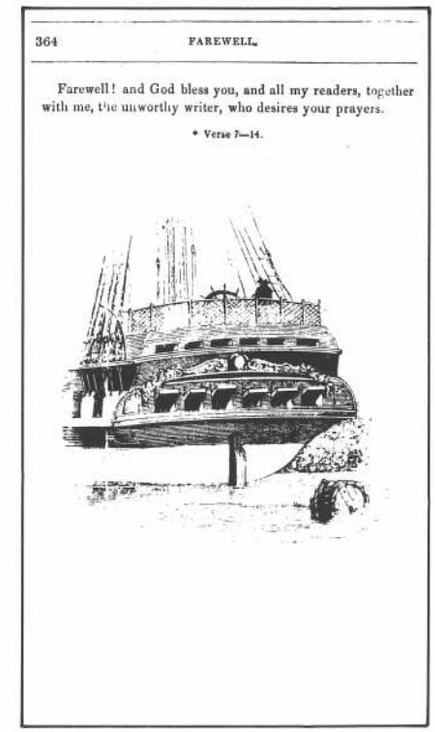
362 GUESSES AT TRUTH.

fitted to the T hole to supply them with air, just as I did to those in the hogshead.

Here is a cut of one of the Hives placed in the bath-room at the stern of the ship. The cylinder is supplied with water from the ship's cistern. I shall also take an Observatory Hive in my cabin; they, of course, will be affected by every change of temperature, so I shall feed them by putting glasses of honey over the holes at the top of the Observatory Hive.

I have given you one prediction touching New Zealand, and the way in which I trust it will be accomplished. Now follows another, which may interest you as much as the other has perchance amused you. Look at page 110, of that most interesting book, "Guesses at Truth." All who have done the good deed of buying "My Bee Book," where much is *guess* work, cannot do better than purchase two volumes of Guesses at Truth, one of which may well stand on each side of mine, to prevent my offspring falling into bad company.

These were the parting words of the Bishop of New Zealand to the inhabitants of Windsor, whom for the last two years he has taught to love him whilst he has filled the lowest office of the Church.



364 FAREWELL.

Farewell! and God bless you, and all my readers, together with me, the unworthy writer, who desires your prayers.

* Verse 7—14.

NBA - sponsored Canadian visitor

A CANADIAN beekeeper, Dr Don Peer of Nipawin Saskatchewan will be making a short NBA-sponsored tour of New Zealand during March.

Dr Peer holds a doctorate in apiculture but instead of pursuing an academic career he opted for commercial beekeeping. He is an innovative beekeeper with over 20 years practical experience. He endeavours to obtain maximum production out of each hive unit. Honey crops of over seven tonnes per hundred hives are routine.

Dr Peer is active in the Canadian beekeeping industry and has been President of the Canadian Honey Council. He has been host to a number of New Zealand beekeepers visiting Canada and has previously visited New Zealand.

While in New Zealand, Dr Peer will address five meetings organised by the MAF and NBA. These meetings are scheduled for:

Christchurch. . . . . March 11
Timaru . . . . . March 12
Gore . . . . . March 13
Hastings. . . . . March 19
Hamilton . . . . . March 20

Don Peer will discuss a number of production and marketing developments in Canada, which should be of direct interest to New Zealand beekeepers. Your district MAF adviser or local NBA branch secretary should be able to provide you with further details about the time and venue of the meeting.

The pollination of strawberries

by Elbert R. Jaycox, Extension Beekeeping Specialist, University of Illinois.

THE POLLINATION of strawberries is a complicated process that is influenced by the cultivar (variety) and the nature of its flowers, by the weather, and by the insect visitors to the flowers. Yet in spite of that complexity in their fruit setting, all commercial strawberry cultivars produce a reasonably good crop without any special provisions by the grower for pollination. Naturally, this does not include the years when freezes, flooding, or other catastrophes reduce or destroy the crop.

The consistency of fruit production by strawberries is, no doubt, responsible for the tendency for growers to overlook the chance to increase their yields by improving pollination. Nevertheless, they are generally concerned about all the other parts of crop management that affect yields, including fertilisation, irrigation, pest and weed control, etc. The grower who aims for **maximum** yields and economic return from producing strawberries should be as concerned about pollination as he is about the other components of fruit production. Let's look at the reasons for such a statement, starting with the flower of the strawberry.

From flower to fruit

The structure of the strawberry flower

The strawberry flower on our commercial cultivars is called a perfect, or hermaphrodite, flower because it has both male and female structures in the single flower. At the centre of the five white petals is the receptacle. It is cone shaped and covered with 50 to 500 individual pistils. When fertilized, the ovaries in the pistils develop into achenes. We usually call them seeds. Each pistil is topped by a receptive surface, the stigma, where a pollen grain must land for fertilisation to occur. Around the receptacle are 20 to 35 stamens, each with an anther in which pollen is produced. Between the ring of stamens and the base of the receptacle, there is a nectary. This narrow band of fleshy tissue secretes nectar containing about 30 per cent sugar.

Development of the fruit

Fruit development begins when a pollen grain reaches the stigma of the flower. It produces a tube that fertilises the ovary in 24 to 48 hours. The fertilised ovules release a hormone that stimulates growth of the receptacle around them. When most of the stigmas of a flower receive pollen, and the achenes contain developing seeds, the receptacle expands into a well-developed strawberry fruit. Without sufficient pollination, the berry is smaller than normal and frequently deformed because of the irregular expansion of the receptacle. Frost and insect injury may also cause such undeveloped fruits.

How pollination takes place

Self and wind pollination

When the strawberry flower opens, the stigmas are immediately receptive to pollination. The bright yellow, pollen-filled anthers dry out for a short time before they split open and release their pollen. The drying creates some tension in the anther so that the pollen is released under pressure, causing it to disperse onto many of the nearby stigmas. Movement of the flower due to wind or insect visits also helps in dispersing the pollen. However, the wind helps only in pollination within a flower, not between flowers. Temperatures of 53 deg F or above are required for the anthers to open and release pollen. Pollen may be shed during more than one day, usually more heavily in the morning than later in the day.

The first or primary flowers may shed noticeably less pollen than flowers blooming later. Those stigmas that are not immediately self pollinated remain receptive up to a week or more in cool weather, thus allowing early flowers to be fertilised by pollen carried by insects from later-opening ones. After the anther sheds its pollen it becomes pale coloured; pistils change from yellow-green to a dark colour after being pollinated.

Insect pollination

More than 100 species of insects, mostly bees and flies, may visit strawberry flowers in any one area (Nye and Anderson 1974). Not all of them are good pollinators, either because they do not carry much pollen between flowers or because they do not contact both the anthers and the stigmas. The bees and the flies are the best pollinators of strawberries. Among the bees, the honey bee is usually the most common. There are also good pollinators among the many wild, solitary bees, which nest individually in the soil and elsewhere.

Honey bees collect both nectar and pollen from strawberry blossoms. When collecting nectar, they usually contact the anthers and stigmas and effect pollination when the pollen on their hairy bodies contacts the stigmas. Pollen collectors intentionally contact the anthers to get the pollen from them. Honey bees and other bees cross pollinate the flowers by transferring pollen between flowers. They also aid in self pollination by moving the anthlers and the entire flower so that pollen falls onto the stigmas from the anthers.

Among the flies, those known as syrphids, hover flies, or flower flies are the best pollinators. One species, the drone fly, looks very much like a honey bee. The flies eat pollen and nectar but do not collect it as the bees do. They are active at temperatures too low for good bee activity but high enough for pollination to take place. Overall, the flies are considerably less effective pollinators than the bees.

The relative importance of insects for fruit set

Since commercial strawberry cultivars are self fertile and largely self pollinating, it is important to consider whether insect visits increase yields enough to worry about them. The evidence from studies in the United States and elsewhere is somewhat conflicting. Insect visits have not always produced greater overall yields but they consistently increase the size and quality of the fruit and greatly reduce the quantity of malformed fruit, which may be unsaleable.

In an Arkansas study, J.N. Moore (1969) found that caging strawberries to exclude insects reduced yields 32 to 71 per cent in four years of tests. About 48 per cent of the berries in the cages were deformed compared with only 15 per cent on plants in the open. John Free (1968) demonstrated that pollination by bees in England increased the percentage of flowers that set fruit, the weight of the individual berries, and the percentage of well formed berries.

Connor and Martin (1973) compared the pollination of 11 different cultivars in Michigan to determine what portion of the fruit set was due to selfing alone, selfing plus wind, and all factors including insects. Mean values were 53, 67, and 91 per cent respectively. Ten of the 11 cultivars benefited from insect pollination. Honey bees improved yields by 19 to 22 per cent (Connor, 1970).

The strawberry flower benefits from repeated insect visits because many pollen grains are needed to produce a plump fruit. The percentage of flowers that set fruit increases with an increasing number of bee visits up to 15 to 20 visits. As the number of visits increases up to 60, the mean weight of the berries also continues to increase (Skrebtsova, 1957). Only with high insect populations will the flowers receive multiple visits.

Darrow's (1966) statement appears valid: "Bees are essential for the best pollination in the field."

Flower characteristics and pollination

The structure of the flower differs between strawberry cultivars and between first flowers (primaries) and later ones. Such differences have probably been responsible for much of the lack of agreement on the value of insects for strawberry pollination. The differences went largely unnoticed until Connor and Martin (1973) took a close look at the height of the anthers in comparison with the height of the pistils and receptacle. Some cultivars have short stamens and tall receptacles; these are benefited most by insects. Cultivars with tall stamens in relation to receptacle height are largely self pollinated and receive less benefit from insect visits. The difference between the floral parts is greatest in the primary blossoms but becomes smaller with successive bloom.

In short, strawberry flowers are self pollinated readily if the pollen is released above or even with the stigmas. Wind and the resulting movement of the flower also help. However, when the anthers are lower than the receptacle, not enough pollen reaches the stigmas to set a well-formed fruit without the help of insect visitors, usually bees.

Strawberry growers can check the relative heights of the stamens and receptacle in their cultivars and determine, in part, the benefit they might gain from providing pollination. Obviously, many other factors are involved.

One such factor is the attractiveness of the cultivar to insects. For example, 'Midway' is highly attractive to bees for both nectar and pollen. 'Sunrise' is attractive for nectar but not for pollen. 'Redchief' and 'Guardian' are generally unattractive to pollinators. Unattractive varieties benefit most by the provision of colonies of bees close to the field. For all cultivars, the economic benefit from using bees for pollination is greatest on the primary bloom.

Insecticides and pollination

Insecticides applied during bloom may reduce pollination, fruit set, and yield of strawberries. The first spray should be applied **before** bloom, not after blossoms appear, in order to avoid killing the honey bees, solitary bees, and flies visiting the flowers. An application of azinphosmethyl (Guthion) on blooming strawberries can reduce to zero the number of pollinators for two to six days. That may be the critical period of primary bloom, especially if the weather is favourable. If you are forced to spray when the plants are in bloom, use the material least toxic to bees and apply it late in the day when few bees are flying. Most fungicides are relatively nontoxic to pollinating insects.

Recommendations

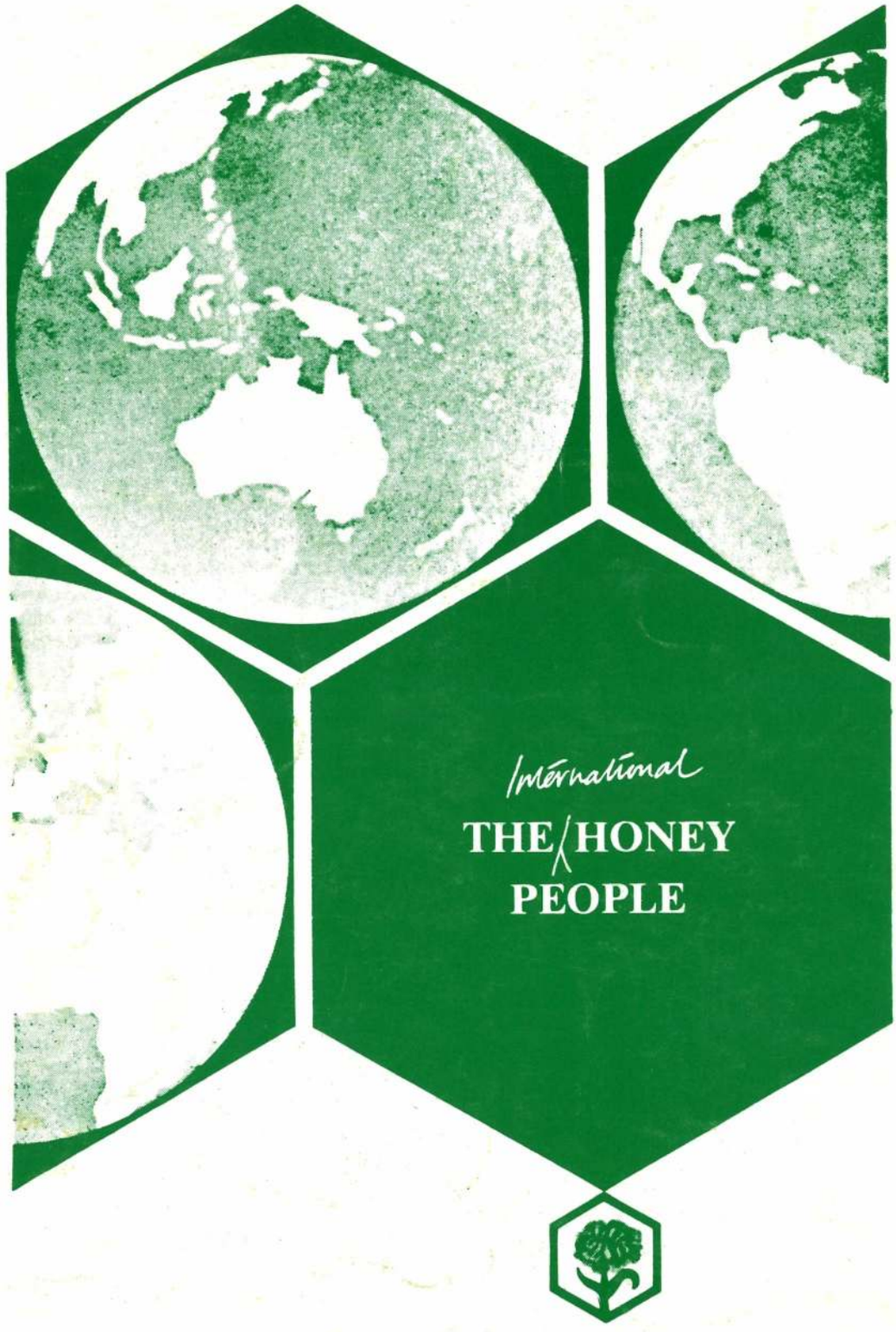
Every strawberry grower should provide himself with some pollination insurance in the form of honey bees. It is difficult to say exactly how many colonies (hives) are needed because of the differences in cultivars and farming areas. However, a single hive would be better than none; one hive for each two or three acres will certainly return more than their cost, but the returns are often difficult to measure.

In deciding how many bees to use, consider the surrounding area. If it is heavily cultivated, you will probably need more bees because native insects may be scarce. Competing blossoms draw bees away from strawberry bloom. Provide more honey bees where such competition exists nearby.

Move the bees to the field when the primary flowers are opening. You will gain the most if these early flowers are visited repeatedly by bees. Later flowers are largely self pollinated without help from insects.

If you are skeptical about using bees for pollination, learn how to judge whether your strawberries are adequately pollinated. Look at the flower structure, compare the numbers of insects on the flowers of different cultivars, observe the colour change among the pistils on the primary flowers, and obtain some measure of the percentage of deformed berries on the plants at harvest. After doing all that, you should know whether additional insect pollinators were needed.

Reprinted from August 1979 issue of American Bee Journal.



International

THE HONEY PEOPLE

KIMPTON BROTHERS LIMITED

Honey and beeswax specialists

ESTABLISHED 1882

2 CHANDOS STREET LONDON W1 TEL 01-636 7525 TLX 263061