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Cover
One of the apiaries of Vangelis and Irini Marabeas at Trachila, in the Mani, Messinia, Greece. *photo: J.Phipps*

Editorial

Back on the tracks . .

I don't know which is the easier - establishing a new magazine or being involved in the re-launching of one that has not been published for a while. I guess I'll soon find out. Unfortunately, when there is a pause in publishing, communication breaks down, contacts can be lost and much needs to be done to re-establish links. However, having had the help of past editors, particularly Matthew Allan, the magazine is back on the beekeeping scene once more. As the title of the magazine suggests, Bee Biz is produced for anyone involved in commercial apiculture - bee farmers, packers and distributors of hive products, appliance manufacturers, entomologists and research scientists working with bees, people involved in rural development where beekeeping can either benefit the local population or help them to establish markets, and officers and technicians in government departments. Put all this on a global perspective, then the scope of the magazine is enormous and we need to trawl from this vast pool for contributors who are willing to share with us their experiences, their research, their ideas and their news. Feedback on the magazine's contents will always be very welcome. I doubt if everyone will always agree with the opinions or views of either the editor or the contributors - so please feel free to criticise and comment on articles found in these pages. Even better, increase the readers' knowledge of a topic by adding your own experiences - and don't be frightened of giving praise where it is due: it helps enormously for a contributor to know that their work is appreciated and valued.

Knowledge is available much more widely now than ever before, thanks to the internet, but surfing websites can be very time-consuming for people who already have too much to do. Hopefully, Bee Biz would like to act, at least as a half-way house in this respect, for in future issues we plan to keep readers up-to-

Bee Biz editor, John Phipps

date with some of the best and most useful sites - so send in your recommendations to the editor.

On my part, I will bring to the magazine my thirty years of beekeeping experience, including the running of sixty hives in the UK, marketing honey, writing, editing and photography, visiting beekeepers throughout western and eastern Europe and being involved in a commercial beekeeping enterprise where I now live in Greece. Once I am involved in a project I like to see it through and I am determined to try and ensure that we get back to publishing Bee Biz regularly, with three issues per year. With your support, I am sure that this can be achieved.

Coumaphos

In the November issue of The Beekeepers Quarterly, Roger White ('From Cyprus') wrote about the poor development of queens that he and colleagues in Israel, and elsewhere, were experiencing when coumaphos (particularly CheckMite) was used as a means of varroa control. In the February issue of The Beekeepers Quarterly, there was a report of Haarmann & Spivak's research (re-printed from December ABJ) which confirmed that coumaphos was having many detrimental effects on both drones and queens and the recommendation was that this chemical should not be used. A recent editorial by Kim Flottum (Gleanings in Bee Culture) summarised the problem too and assured readers that, in light of the research, their bad queens were not, perhaps, after all a result of improper management.

In November BKQ, I published a statement from Bayer, the producers of Apistan and CheckMite. Regarding the effect of their product on queen and drone development they replied:

1.) The specific experimental conditions to which queen larvae have been exposed are not known to Bayer Animal Health, as well as analytical methodologies applied to detect Coumaphos in wax and queen cells. It is therefore difficult to comment on the findings of the authors. However, Bayer is taking the results seriously and will investigate this matter further.

2.) Intolerance of CheckMite in bees was not observed to date in studies conducted in various European countries and the US.

3.) Hundreds of thousands of bee hives have been treated with CheckMite in the US since the product became available in 1999 and no intolerances have been reported so far.

4.) We consider Checkmite an essential tool for strategic Varroa mite control, particularly in view of the wide-spread pyrethroid resistance.

Yours sincerely,
Dr. Hans - Dieter Hamel, AH - M /PFM - Livestock
Dr.Josef Heine, AH -R&D - Parasiticides"

The findings of Haarmann and Spivak are well known now throughout the beekeeping world, but as yet, I have had no further reply from Bayer. The silence is deafening.

Orientation of frames in the hive

The 'warm way' or 'cold way' of placing frames in hives has been the subject of fierce debate for many years in beekeeping circles. The 'warm way', with the frames horizontal to the entrance, was described to me as being bad for bees, for in winter a build up of dead bees near the entrance could reduce the amount of ventilation or block the exit completely, obviously something which isn't in the best interest of the colony. As for the 'cold way', with each of the frames being at right angles to the entrance, it is thought that with all of the frames being exposed to the front of the hive, then there might be the possibility of brood becoming chilled.

In some cases, the orientation of frames is dictated by the type of hive and sort of beekeeping employed. For instance, with the hives tightly packed together in a western European beehouse, where the hives are in tiers, it is important that each frame can be pulled out sideways.

However, what I cannot understand is that in a country like Greece, where Langstroth hives are used almost exclusively, the frames are always 'cold way' aligned. What makes me question this orientation is that the hives are invariably packed together (see cover photograph) with little or no space between them and operating them from the back you have to stand at an awkward angle to remove the frames. After going through 120 hives the pain in your back can be enormous. It would be far simpler if the frames were the 'warm way' round and the only main alteration needed would be to modify the Langstroth floor - a simple and cheap solution.

The honey market

The world honey market is in a state of flux at the time of writing. Two of the world's leading exporters, China and New Zealand, are unable to offer the suppies the market normally depends on. In the first case, China, which had a shortfall in last year's honey production, is now experiencing the removal of its products from European shelves because the honey was found to have traces of the antibiotic, chloramphenicol. The Food Standards Agency have taken great pains to notify consumers

that the traces were incredibly small and completely harmless. However, they say that their action involving a ban on future imports and the withdrawal of honey was in line with current EU regulations that require that all honey should be totally free of antibiotics - there are, apparently, no low thresholds which can be tolerated. Obviously these are sad times for China, the world's largest honey producer and exporter, whose industry has made such phenomenal development in the last decades and which is described in detail by Dr Prof Li Janke in a major article in this issue. In the interests of consumers it is important that such 'watchdogs' exist for their protection. What we must all be sure of though, is that our own produce would also stand up to the stringent testing required for imported honey.

As regards New Zealand honey, there has been over a 60% loss on expected yields - a considerable amount for the industry to both bear and to recover from.

In times like this, no doubt, importers will have to look elsewhere so that they can fill their demands for honey. This may well be a shot in the arm for those countries which are seeking to develop their honey industries - and hopefully, once they are fully involved in the market place their presence there will be sustained.

Beekeepers as pest removers

Being called out to deal with wild bees, errant swarms, wasps and almost anything else which flies, tends to be part of many a beekeeper's everyday life in summer. The question often posed over this matter is should it be considered a duty, a free service, or one that the householder should pay the going rate for.? With swarms, sometimes the beekeeper is happy to remove the bees, especially if he has need of them - and in many cases has to field off the issue of having to buy them off the householder because of the 'bees are worth a lot, aren't they?" attitude. Some beekeepers consider it their duty (their bees might be responsible after all) and like the opportunity to educate members of the puiblic about bees. Beekeepers have two important assets for 'pest control' - the equipment to deal with the insects and the abilty to get the job done. However, most commercial beekeepers have no time to deal with such work voluntary - nor should they be expected too; after all, anything to do with bees is, by extension, a part of their business and ought to be paid for. I know of many beekeepers who carry out this service as part of their business and have the advantage of being able to deal with problems when public service officers are usually not at work. In areas of the world where Africanised bees are a pest, understandably the residents want the problem dealt with as quickly as possible and fees earned for dealing with them could be significant. Remember, though, that if you are considering do this as a side line then you need the right insurance - to cover both yourself and third parties.

And finally . . .

Thanks to the contributors in this issue who turned round their material quickly so that the magazine would be with readers as soon as possible, to Mike, our designer, whose server I must have overloaded on many occasions and to my wife for covering up the mistakes I made, with her careful and studious proof-reading.

(below) The editor is never too busy to hear from you .....

Publisher's statement

WE HOPE you will enjoy reading this latest issue of Bee Biz. We apologise for the gap in publication, since the last issue in November 2000.

It is our strongly held view that there is a place for an English language beekeeping magazine, written for the commercial apiarist world wide. We felt that beekeeping practices and their problems vary but the solutions will have universal interest to all in the commercial world.

These views were confirmed by the successful early issues, first under the editorship of Matthew Allan and later Ana Lucia Merlo, which were read by beekeepers in over 50 countries. Unfortunately Ana was unable to carry on as Editor and although we considered terminating publication it was the consensus from our readers that we carry on publication after a new editor was in place.

John Phipps has been editor of The Beekeepers' Quarterly for over 17 years, establishing it as a leading British journal.

We are pleased to continue this partnership with the publication of Bee Biz Issue 13

He may be contacted by e-mail at jdphipps@otenet.gr for your letters, comments and hopefully your articles on commercial beekeeping world wide.

Ruth & Jeremy Burbidge, Publishers
beebiz@recordermail.demon.co.uk

news

NEWS ... honey, beekeeping associations, conferences/shows, research/science, new equipment, bees in the press . . . . .

The honey market

Market update 18th October 2001

(Compiled by Fuerst Day Lawson Honey Limited)

After the significant price rises seen over the last few months, the honey market appears to have entered a period of relative calm. But there are a number of conflicting signals, primarily based upon the actual shortage of Chinese honey and the forthcoming Argentine crop, which could upset the tranquility.

Over the last six months, Chinese prices (ELA/LA grades) have risen by 40% in US Dollar terms, largely because of the poor 2001 Chinese crop and the relatively high level of demand from Japan and the USA. The total Chinese crop in 2001 probably amounts to no more than 85,000 mt, a decline of 30% compared to the 2000 crop, although it can now be confidently stated that there are now no more than 15,000 mt of good quality (that is, not adulterated) stock left. With the Chinese crop now over, this will have to last until the new crop starts next April/May. It is clearly insufficient to meet the actual and potential demand.

At the time of writing this report, some Chinese factories are obliged to repay their loans to the banks, and, having seen the value of the honey increase significantly in recent months, they are naturally keen to sell. This has tended to introduce a tone of weakness to the Chinese honey market, although this is no more than a temporary phenomenon, and, anyway, one that is relevant only to prompt shipments. It is still impossible to buy honey for forward (December 2001 and onwards) shipments. Any future business is, at best speculation.

This weakness will pass quickly, and we are then left with some particularly positive factors, other than the physical shortage of raw material:

a) Demand from the USA: it has been widely expected that the USA will return to buying Chinese honey in November, despite a 25%+ duty being applied, compared to a 40% duty being applied to Argentine exports. At current prices, it is still worthwhile the USA buying Chinese honey in preference to Argentine (even if there was some Argentine honey available!). Of the 15,000 mt left in China, it is anticipated that at least 50% will end up in the USA, either directly or via Canada (which has seen a 196% increase in shipments so far this year) or via Mexico (which has received an increase of 114% compared to 2000, and not much of this honey has remained in that country!);

b) Japan: already the biggest importer in the first six months of the year (taking 18,000 mt), a good level of demand continued well into September. Of late, after a particularly hot summer,there has been a decline in demand, but it is clear from the current Guangzhou Trade Fair that the Japanese need to buy honey within the next couple of weeks (for prompt shipment). In addition, they will need to buy for their further requirements to cover the next six months, or so, until the new crop;

c) Germany: despite all the apparent qualitative problems with Chinese honey, in the eight months to the end of August 2001, Germany imported 8,700 mt, over double compared to the previous year. This demand is continuing.

Domestic prices are expected to increase over the coming months to reflect both international as well as an increase in domestic demand.

The new Argentine crop is expected to start in late December 2002, with shipments commencing in late January 2002. Because of the extreme physical shortage of old crop Argentine honey – there is now no more than 5,000mt left in the country – it is almost inevitable that new crop prices will be at a significant discount (probably in excess of $ 150/mt) to old crop. Currently, there is a reasonable differential of $ 270/mt between Chinese ELA/LA and Argentine max 50mm (old crop), but, in the absence of any real crop scares in Argentina, this will reduce to below $ 150/mt, which is low. Although much depends on the size of the Argentine crop, the likely effect of this is to put a limit on the upside potential for Chinese honey, despite its very bullish fundamentals. Despite this, there is no chance for Chinese honey to decline in price until the 2002 crop starts, and the key to future price developments lies in Argentina, and, of the new crop there, very little is yet known.

As the northern hemisphere goes into its winter, demand is good, and we expect this to remain so for the coming months.

No mention has been made in this report of Mexico and of Australia. Both these countries will have new crops within the next couple of months, or so, but their effect on the world market is limited compared to Argentina and China.

Chinese honey: chloramphenicol safety statement

(February 2002)

The Honey Association confirm that traces of chloramphenicol, an antibiotic drug, have been found in samples of imported Chinese honey.

As a result, the Association has advised all its members to withdraw any blends containing Chinese honey from the retail shelf.

This recommendation has been undertaken with full co-operation between members and retailers.

The FSA state, however, that their primary concern is with the legality of the use of this antibiotic. The levels found in tested honeys have been so low that it does not constitute a major health risk.

All existing stocks of Chinese honey in the UK will now undergo very stringent tests and will only be released for production if they fully comply with the EU Commission Decision.

This voluntary testing programme will also apply to industrial blends containing Chinese honey (which are often blended in production), as well as shipments from China already on the sea when the EU suspension was put into effect. Any honeys not complying will be rejected.

The Association is now advising its members to seek alternative sources of honey from worldwide origins until the issue of an acceptable standard of monitoring programme in China has been resolved.

This will obviously have pricing implications throughout the industry, but it is of paramount importance to all members to maintain consumer confidence in honey overall as a natural, energy-giving food- and therefore its compliance with EU regulations.

There are many sources of origin around the world, and the Honey Association members already import honey from more than fifteen countries - much of which is marketed and labelled as a single origin, or monofloral variety, as well as being a major component in many of the popular brands of blended honeys.

Honey and streptomycin - Your questions answered by the Food Standardards Agency

What were the results? Seven out of 15 samples of honey (purchased from High street stores and two Chinese specialist shops) tested positive for

residues of streptomycin. Streptomycin is an antibiotic used to treat bacterial diseases in cattle, pigs and sheep. No samples from the Chinese shops tested positive.

Are there any food safety concerns? No. This is not a food safety issue. The public can continue to consume affected products already in the home. The products are being withdrawn because honey cannot legally contain streptomycin and should not be there. An adult would need to eat around eight standard jars of this honey every day for there even to be a potential health risk. Toddlers would need to eat a jar and a half a day (unrelated to this issue, the Agency does have existing advice that honey should not be given to infants under 12 months old because of the small risk of botulism).

What action is the FSA taking? While the levels of streptomycin do not present a safety concern, the presence of stretpomycin is not permitted in honey produced or imported into the EU. The Agency has advised the relevant companies of the test results. The companies are co-operating fully in the withdrawal of the affected products, which is now underway.

Can I still eat Chinese or blended honey? The Food Standards Agency is not advising against the consumption of Chinese or blended honey.

How do I know where my honey comes from to make a choice about what I eat? A lot of products are blended with honey from more than one country. Much of this will contain Chinese honey, although not all. People who want to know where the honey they are buying comes from should check the label, but that may not stipulate which countries the honey comes from. If in doubt, ask the retailer.

Shoppers face year-long honey drought

Robert Uhlig, Farming Correspondent

From The Daily Telegraph, UK.

HONEY stocks are at a record low in Britain after a European Union health warning on Chinese imports and the collapse of the New Zealand honey harvest, beekeepers and retailers said yesterday.According to the Honey Association, many shops have already sold out of honey and the shortage could last for up to a year.Thomas Heck, the association's chairman, said honey packers relying heavily on Chinese imports had been "hit in the jugular" after the Food Standards Agency recently demanded a withdrawal of all the country's honey and banned all imports. Suppliers have been scrambling around for alternative sources, but these are in short supply because rainy weather and an outbreak of varroa, a blood-sucking mite that attacks bees, have destroyed the New Zealand Manuka honey harvest.A spokesman for the British Retail Consortium said there was "a bit of a honey drought" that had been made worse by shoppers stockpiling honey.

Professional associations

The Honey Association

The Honey Association is the trading name for the British Honey Importers and Packers Association which includes members such as Nestle, Rowse, Martlett, Cotswold, Chivers, Hartley etc and other packers and importers of honey in the UK.

From Monday 4th February, The Honey Association held its annual National Honey Week and as well as promoting honey through the use of recipes which included it as an ingredient, on their website (www.honeyassociation.com), the association had a hit squad of bumblebees which offered honey sandwiches to commuters at Liverpool Street Station .

The European Professional Beekeepers' Association

(During the German Professional Beekeepers' Congress in DONAUESCHINGEN on 25/26 October 1997, professional beekeepers from Austria, Italy, France and Germany founded the "European Professional Beekeepers Association" (EPBA).

The reason for this decision was the following: all professional Beekeepers in Europe have the same problems. The EPBA plans to unite national professional beekeeping organisations so as to increase their effectiveness and power. EPBA's objective is to protect the future of professional beekeeping in Europe and to increase its influence on the new European Honey directive (EU Directive 12.21) in order to improve the quality of European honey production.)

Report concerning the current problems of the European professional beekeepers with proposals for the APIMONDIA and professional colleagues from other continents on how to overcome problems and thereby improve the situation for colleagues worldwide.

In the EU, there are currently a good 30 000 professional beekeepers/people working with bees who are members of the EPBA. The EPBA has worked for 5 years to ensure the existence of the professional beekeeper and to coordinate solutions to problems, and has been lead by Commissioner Singer during this period, who was elected democratically by the national associations as President of the Presidents for the duration of 3 years at a time. New professional beekeepers' associations will be formed by Singer in the countries acceding to the EU (Hungary, the Czech Republic, the Slovak Republic, Poland and Slovenia) and they have already been invited to become members.

Co-operation is being brought about between the Honey Association (registered charity) and the European Honey Organisation FEEDEM with the EPBA concerning the problems they have in common.

In the EU, there is a sharp drop in professional beekeepers from north to south. In the north, in

Promoting honey at Liverpool Street Station, London.
Commuters were offered free pack-ups of honey sandwiches.

countries such as Sweden, the businesses tend to be small businesses owing to the climatic and structural conditions, compared to those in the south of Europe, in the Mediterranean countries for example. In the EU, a business of 150 hives counts as a profit-making beekeeping business. We have people working with bees in businesses from this size up to those in extreme cases of up to 12 000 beehives. As standard, each professional beekeeper has between 300 and 1 000 hives.

The European Professional Beekeeping can draw on a long tradition. Beekeeping schools, bee institutes and the many family businesses over the generations testify to its history. This centuries-old tradition has lead honey to establish itself in Europe as a popular food, and the population of Europe consumes a great deal of honey because of this, more than the domestic beekeepers can produce. Europe is the classic honey import area in the beekeeping world.

The problems of the European Professional Beekeeping, in order of their importance, are as follows:

Honey Sales: Europe is witnessing a change in the consumer structure and in the sales markets. Older people, the classic honey consumers, are no longer being reached as direct customers owing to their old age (old people's homes), and single homeowners consume ready-made products. This means that honey is losing its market share. Small set-ups are preferred.

The large food markets mean that the individual beekeeper and the cooperative suppliers are dropping out of the market. This structural change is leading to a backlog in sales, and honey is losing its market share.

One solution to the problem may be to introduce target advertising (e.g. Spain). Through globalisation, this problem ought to be taken on by all honey producers and traders worldwide.

Backlog (residues) problems among the beekeeping products, Varrooosis and AFB: The agricultural chemicals that are becoming drastically evident to us as bee toxins are becoming an increasing problem in intensive farming. We are finding these on our bees and in the products from the bees.

One further group comprises the Varroa treatment along with its by-products.

Following the repeat of the scandal concerning antibiotics in food, the backlogs of honey from bees are now also being analysed. The results show us that there is a serious worldwide problem. This taboo theme will not be solved by keeping quiet. Beekeepers, bee scientists, beekeeping schools and traders therefore need to come up with a rapid solution. Changes need to be made to businesses. American foulbrood must be decriminalised as a notifiable disease and the destruction of bee populations affected should be an obvious requirement over compensation figures. These means of compensation can be met jointly by the beekeeping associations, traders and cooperatives.

Production costs: The product prices are becoming more and more similar due to the globalisation of world trade. Fixed costs vary from region to region. Rationalisation within businesses can help to control this problem.

In Europe, we have taken on too many varied types of business because of the many old national states. This variety must be stopped in terms of rationalisation and the lowering of fixed costs above standardisation (standardisation committee) with things such as beehives. In Europe and particularly in Central Europe, we have over 100 beehive measurements. In future, in the interest of the beekeeper, only Langstroth and Dadant may be promoted.

Laws: The laws ought to be brought into line with one another throughout the world. The multitude of problems in the EU linked to this, as well as time and loss of funds, obstruct the beekeeper in many respects (trade, bee migration, etc.).

Seasonal workforces (workers): The professional beekeeper is dependent upon this. It would be good to base a workforce exchange between the northern and southern hemispheres of the Earth during the bee season for the purposes of having qualified employees. Its formation would have to be organised throughout the world on the basis of the Canadian model.

Specialisation of businesses: As our colleagues from overseas have already been showing us for decades, the professional European beekeepers now also need to specialise if they wish to remain competitive.

The APIMONDIA and the professional beekeepers worldwide should bring these exemplary problems into the current problems of professional beekeeping, for co-operation such as a new "Permanent/standing Commission of Professional Beekeepers" to be formed in a team within the organisation of the Apimondia or in a worldwide professional beekeepers' association. On the basis of this, I, as Commissioner of the EPBA, have put this in a proposal to the APIMONDIA and would like, on behalf of the EUROPEAN PROFESSIONAL BEEKEEPERS' ASSOCIATION, to thank Mr Jörgensen, the President of Apimondia, for giving the representative of the professional beekeepers the opportunity of presenting the problem within the framework of this congress.

Let's get organised here and now in Durban!

Here's to joint co-operation in the interest of all beekeepers,

The Honorary Harald Singer
(Addressed to Mr Asger Sogaard Jorgensen, President of Apimondia, September 2001 - from
Harald Singer, EPBA Commissioner, A-8634 Wegscheid, AUSTRIA. Tel. /fax: 0043 3884 550 e-mail: singer1@utanet.at)

Apimondia Congress

The winners of medals at last year's Congress in Durban in October are listed below. The next International Apimondia Congress will take place in Ljubliana, Slovenia, from the 24 - 29th August 2003. It has as its theme: *Beekeeping, A way of living*. Details of this event are available from Mr Gorazd Cad, Cankarjev, Presernova 10, S1-1000 Ljubliana, Slovenia. Website: www.apimondia2003.com Email: gorazd.cad@cd-cc.si Tel: 00 386 (0) 12417 134 Fax: 00 386 (0) 12417 296**1.**

Technical beekeeping inventions

Nikola Kezic (Croatia): Bee box for transporting bees. Gold medal

Kamran Fakhmzadeh (Finland): Varroa detection device. Silver medal

Mario Schehle (South Africa): Apicomputer scale

2. New products from the beehive

Miguel Farioli (Argentine): Fruit honeys. Gold medal

Tentorium (Russia): Three pictures in wax. Silver medal

Franc Marolt (Slovenia): Beeswax candles. Bronze medal

3. Mead

Michael Mehler (Germany): Gold medal

Janusz Kasztelewicz (Poland): Silver medal

4. Promotional packaging

Tentorium (Russia): Health line packaging, catalogues, pens and cards. Gold medal.

Virginie Palmeri (Cote D'Ivoire): Design for table cloth. Silver medal Thomas Carroll (Kenya): T-shirts. Bronze medal

5. Films, videos and slides on beekeeping subjects

Donat Waltenberger (Germany): Busy bees. Gold medal

Gerald Kastberger (Germany): Defence strategies of giant honeybees. Silver medal

Mogens Jensen (India): Honey hunters of the blue mountains. Bronze medal

6. Photographic displays

Franc Sivic (Slovenia): Gold medal Luca Mazzocchi (Italy): Silver medal Didik Budi Purwanto (Indonesia): Bronze medal

7. Teaching material about bees and beekeeping

Stephen Ware (Australia): Teachers resource kit. Gold medal Barbara Gemmill (Kenya): Pollination pamphlets. Silver medal

Virginie Ambougou Palmeri (Cote D'Ivoire): Beekeeping in pictures. Bronze medal

8. Books and CD's on bees and beekeeping: Practical books

Hanspeter Fischer (Switzerland): Beekeeping. Gold medal Salomon Handel (El Salvador): Beekeeping. Silver medal

Marija Mlaker (Slovenia): Beekeeping. Bronze medal

9. Books and CD's on bees and beekeeping: Academic books

Zbigniew Lipinski (Poland): Essence & mechanism of nest abandonment by honeybee swarms. Gold medal

Keith Delaplane (USA): Crop pollination by bees. Silver medal

Richard Jones (Wales): Honey and healing. Bronze medal

10. Books and CD's on bees and beekeeping: Collectors books

Janusz Kasztelewics (Poland): Beehives and apiaries in Poland. Gold medal

Reneo Barbattini (Italy): L'Ape. Silver medal

Tentorium (Russia): Selections of children's drawings. Bronze medal

11. Journals on bees and beekeeping

Apitalia (Italy): Gold medal

Mehlilainen (Finland): Silver medal

Norwegian beekeeping (Norway): Bronze medal

12. Beekeeping collections

Elizabeth Schnetler (South Africa): Beaded bee. Gold medal

Belinda Kelly (South Africa): Wooden map. Silver medal

13. Beekeeping websites

Raymond Chamberlin (England):

www.bees4kids.org.uk - Gold medal Keith Delaplane (USA): www.ent.uga.edu/bees - Silver medal Thomas Barrett (Ireland): www.irishbeekeeping - Bronze medal

14. Exhibitions stands (Large)

Tentorium (Russia): Gold medal

Vita Europe (United Kingdom): Silver medal Multi box (Croatia): Bronze medal

15. Exhibitions stands (Medium)

Honey Bee Farms (South Africa): Gold medal Bayer AG (Germany / South Africa): Silver medal

Transhoney SA (Argentine): Bronze medal

16. Posters

Marina Basualda 1st prize, Pro Meritis certificate Pam Gregory: 2nd prize, Pro Meritis certificate Marianne Forsyth: 3rd prize, Pro Meritis certificate From: www.apiservices.com

IBRA's sixth European beekeeping conference

IBRA's conference will take place from 1st -5th July, 2002 at Cardiff, Wales. The theme of the conference is Bees without Frontiers and will consist of a series of scientific sessions exploring the impact of honeybee movements:

Ecological Impacts and Regulations, Dr Keith Delaplane (University of Georgia, USA)

Natural Bee Movement, Dr Juliet Osborne (IACR, Rothamsted, England)

The Spread of Exotic or Undesirable Genotypes and Control of Pests and Diseases, dr Ingemar Fries (Uppsala University, Sweden)

The Genetics of Bees and their Predators, Dr Rober Paxton (Tubingen University, Germany)

Bee-mediated pollen dispersal: how far and how effective, Dr Bernard Vaissiere (INRA, Avignon, France).

There will also be plenary session for leaders of current research projects to report on their work.

For more details contact IBRA: Tel. 0044 29 2037 2409 Fax. 0044 29 2066 5522 Email conf@ibra.org.uk

The National Honey Show 2002

This is THE BIGGEST and BEST Honey Show in the World! Why?

The entries and exhibits are of exceptional quality, demonstrating master skills within spectacular displays, alongside major trade stands where all appliances, crafts, information and products associated with honeybees and hives feature prominantly. Other related associations, organisations, charities are also represented. We have highly qualified and experienced judges to (attain/retain) World

Class standard/status. Top lectures are delivered by(famous/known and respected)lecturers. All sections of the Bee Press carry advertisements and articles about the NHS on a regular basis throughout the year. Media coverage is inspired through radio, T.V, press, other publications, video interviews, news and pictures via the web, prior, during and after the show. Our talented Web Master and technical support team demonstrate our sites plus access and links to others. Send us your news of interest for distribution! We aim to attract and support even more exhibitors and visitors to the Show from both the UK and abroad.

This show presents the biggest challenge to Commercial Beekeepers Worldwide- (Successful beekeepers with serious intent on sustainable living, good health, care for the environment

are preparing with a view to winning at this show, now!) -for to achieve World Class Status, you have to first prove the quality of your hive products. This can only be done by daring to enter this Wimbledon of Beekeeping , preparing (superlative) entries and exhibits for judging at exacting standards prior to possible recognition as true champion in a particular class(es).

If you think your honey products take some beating? Prove it! Prepare to enter now! You may win an NHS award card, the official seal of approval! One consequent reward is having your products advertised/ publicised to motivate market outlets to 'head-hunt' you/your produce for a change!

The National Honey Show charity aims to promote beekeeping, encourage greater understanding of related health benefits together with appreciation of all hive products and associated crafts by publicising them through a competitive exhibition, open to the world.

Real success is measured in the increased interest generated at the last show through superb entries, exhibits, lectures, innovations and successful trade stands with a wealth of technical support available. (Visit the web site: www.honeyshow.co.uk)

The intention is to focus on current issues, be on-line for development, prepare for an exciting world-focussed future, concentrating on 'setting' the following:-

1. Publicising beekeeping, natural honey and all products of the hive via extensive media coverage.
2. Activating situations enabling more visitors, beekeepers, entries and exhibits from UK and abroad.
3. Co-ordinating a compelling programme to attract funding and public interest from communities.
4. Extending inter-organisational strengths, cross-pollination of ideas and improved networking.

Beekeepers at home and abroad are invited to prepare for entry, exhibit and attendance at The National Show! To this end, they are reminded to source available

funding, contact their local airline and/or embassy in respect of transport for exhibits, possible personnel/beekeeper representatives. Airlines who do this for free, NHS carry their advert in the schedule by way of thankyou. BUT please check the rulings, EC Directives, import policy appertaining to your country and entries now.

National Honey Show facts re. International Classes:

Classes 1 to 3b are Open to the World

Classes 22 to 48 are open to the World. Class entry fees (50p-£1) apply.

NB. Overseas Exhibitors may pay their subscriptions and entry fees in sterling at the show to save on currency charges. Any prize money will be paid in sterling. Regretfully, some trophies awarded may not be allowed to leave the UK.

Classes 74 to 87 are open to any paid up member from wherever in the world.

Membership is £10 and gives megga benefits including advance copies of the schedule and lecture programme free.

NB Delicious Honeydew beer (Fuller's Pride and Joy) and a Mo-type welcome(oh-oh) will be afforded to any of you commercial beekeepers competing and visiting The National Honey Show 2002

Remember - He who dares - wins! Stake out your future – feature well and wisely at The National Honey Show!

Mo Davies (NHS voluntary publicity person)

New Scientist and Greenpeace science debates

In April and May 2002, these debates will focus on some of the profound ways in which science and technology may affect the way we live and think in thefuture. Held at The Royal Institution in London - the one below may well appeal to beekeepers who are opposed to GM crops and keen on producing organic hive products.

Tuesday 14 May 2002 at 7.30pm

What does the biotechnology century do to our relationship with nature? Will we enjoy wandering through a garden less if we know the flowers are built in a lab? Is our idea of "the natural" simply a romantic myth that needs to be abandoned?

Richard Dawkins, Simonyi Professor of the public understanding of science at the University of Oxford, and author of The Selfish Gene

Patrick Holden, head of the Soil Association and a leading campaigner for organic farming

Aubrey Manning, professor emeritus of biology at Edinburgh University and presenter of BBC TV's Earth Story

Chris Leaver, head of plant sciences at the University of Oxford

As the frontiers of biotech, nanotech and IT get weirder and wilder, are major risks emerging? Should we ban some technologies because they are too easy to subvert? Could we become slaves to the system without even noticing?

Robin Grove-White, professor of science and society, Institute for Environment, Philosophy and Public Policy at Lancaster University

Ian Pearson, futurologist at BTexact

Jon Turney, head of science and technology studies at University College London
http://www.newscientist.com/ads/ns/200202_debate/flyer.jsp

BEE RESEARCH

Summary of a study into hygienic behaviour in England and Wales

Ruth Spinks

The National Bee Unit in the UK co-ordinated a study into the occurrence of hygienic behaviour in 2000 and 2001. The aim of the study was to determine what percentage of bees show hygienic behaviour, and to try to correlate findings with disease occurrence in England and Wales. Hygienic behaviour is often cited as a defence mechanism against both American foulbrood and chalkbrood. Adult honeybees expressing the behaviour detect dead larvae in cells and remove them before bacterial or fungal spores have a chance to develop within diseased larvae, thus limiting spread throughout the colony.

The method chosen involved freezing a section of sealed brood comb to kill the larvae and pupae, then replacing the section in the hive, leaving for 48 hours, then counting the number of removed brood. The adult bees should detect the dead larvae behind the cappings and remove both the capping and the brood. If greater than 95% of the dead brood is removed within 48 hours, the colony is considered to be hygienic.

In 2000, 37 colonies were assessed for hygienic behaviour, with about two thirds also being tested for removal of dead unsealed brood. The first observation of note was the removal of dead unsealed brood, as in most cases, all dead brood was removed; in just three cases were less than 95% of unsealed brood removed. Although this was not part of the assay for hygienic behaviour, it was interesting to note as this may mean that it is the detection of dead larvae, rather than their removal, which influences expression of the behaviour. Six of the 37 colonies showed hygienic behaviour, with greater than 95% of sealed dead brood removed, giving an overall level of 16%.

In 2001, 41 colonies were assayed, this time just for removal of dead sealed brood. A lower percentage of colonies showed hygienic behaviour, just two of those tested (5%). Some beekeepers tested the same colony twice by assaying both sides of the comb for removal of larvae, so in total, there were fifty-three assays carried out.

Another interesting observation over both years was the range of dead larvae removal. There was not an 'all or nothing' response, as variable amounts of brood was removed. It is very likely that more dead larvae would have been removed from the sections if they had been allowed to remain in the colonies for a greater time period. Indeed, it has been said that any colony will remove dead larvae if it is left in a colony for long enough!

In summary, the experiments gave some interesting results, although it was not possible to correlate the data with the vast amount of disease information held by the NBU, due to the relatively low number of datasets. However, hygienic behaviour did occur throughout England and Wales, in areas where there is a high level of disease.

Hygienic behaviour can help prevent high levels of chalkbrood and also acts to limit the spread of AFB. It may therefore be of interest to beekeepers to carry out the assay for themselves, and perhaps breed for colonies with hygienic characteristics. This may be especially relevant if colonies have debilitating levels of chalkbrood. Further details of the method and results can be obtained from the National Bee Unit, Central Science Laboratory, Sand Hutton, York, YO41 1LZ, or e-mail nbu@csl.gov.uk.

New equipment

Beekeeping appliance manufacturers and appliance dealers: please send details of new equipmetto the editor.

Bee-Quick

Just a quick mention - if you haven't read the article on advertising yet! Try Bee-Quick for clearing supers and let the editor know if it lives up to its description.

Multibox

This item won the Gold Medal at the 2001 Apimondia Conference in Durban. The box is the work of Nikola Kezic, from Croatia. It looks like a mesh container - the sort that you might see someone transporting a pet in - but it has a feeder which is fitted in the roof. It can be used for transporting swarms and for treating bees for varroa and foulbrood. The work on the multi-box was carried out at the Bee Institute, in Celle, Germany. It costs 14.90 euros + p&p and is available from: Bienen-Voight & Warnholz, Fasanenweg 1, DE-22851 Norderstedt, Germany. Email: versand@warnholz.de Website: www.warnholz.de - or

check out your local suppliers. More details in the next issue.

Pollen Trap

A new device from Karl Jenter allows the beekeeper to control (and/or trap) the amount of pollen entering the hive thus having important management implications. Email: Karl-Jenter@gmx.de Website: www.Karl-Jenter.de

New products in Thorne's 2002 catalogue:

Fume board for Bee-Quick, National hive only - £11.75 (incl. vat).

Mouseguard magnet - a handle with a magnetic end which holds a drawing pin and allows you to push it easily into the mouse-guard - £1.50 9incl. vat).

Open mesh floors which reduces varroa populations and helps in the monitoring process - also good for overwintering bees and when bees are closed up for transportation - National hive only - £17.34 (incl. vat).

Recoil uncapping machine, from Germany, which can uncap 200 frames per hour. Stainless steel construction, easy to clean and accepts all frame sizes. Safe hnadling as the rotating blades are out of reach of the operator - £1692.00 (incl. vat).

Stainless steel honey valve (one and a half inch bore) with rubber face seal ensuring a positive cut-off, made in Italy - £25.62 (incl. vat).

Thornes Open Day at Wragby Lincolnshire: 13th July 2002, bargains from 9.00am and events starting at 11.00am.

Tayport Sale Days: 23rd August, 2002, 3.00pm - 5.00pm & 24th August, 2002, 9.30am - 1.30pm.

Windsor Sale Day: 14th September, 2002, 10.00am - 2.00pm

Browse products or shop-on-line at: www.thorne.co.uk

Bees in the media

US stinging incidents resulting in serious injury to man or domestic animals are still widely reported in the press, as are also minor events in newly colonized areas. However, minor casualties do not always make local news in those communities where Africanized bees are well established. Removing swarms and nests, however, seems to be an important priority in urban areas and beekeepers can find themselves taking on the role of pest removal officers. Let's face it, beekeepers have the right kit for being able to deal with bees and wasps and with call-out charges from pest firms often being quite high, it could be lucrative sideline for beekeepers. But how many beefarmers have the time?

Bees on the move In Las Vegas, NV, a seasonal pest is already on the move in the valley. Bee complaints are coming in a bit earlier than last year. It's a potentially dangerous problem now that Africanized, or killer bees, are firmly entrenched in our area. Now is the time to watch out while the plants are in bloom and experts say bees are looking for nesting sites. We took an interesting tour with a man who knows his stuff. A bee master who's spent 11 years studying, tracking, and learning all about the habits of bees. If tracking bees is detective work, Rodney Mehring is Sherlock Holmes. It's Mehring's business even if sometimes it's better to watch from a distance. In the southern part of the valley Mehring easily spots numerous colonies out in the desert. But the bees are not sticking to the desert. Mehring has already destroyed several swarms in the past week in residential neighborhoods. The best defense is knowing your property. Bees like irrigation boxes, inside block walls, and under pots. If you think there's a problem, call an expert. "The faster you take care of the problem.... The safer it's going to be," says Mehring. Mehring says there's no section of town immune that's from swarms. And if the desert colonies are any indicator, Mehring knows he'll be a busy bee for the rest of the year. In fact he has a job this weekend where bees are nesting inside the walls of a local home. Mehring says one of the worst cases he's ever seen involved 350 pounds of honey inside a wall. When that happens, bee removal is only part of the problem. Melting honey can cause thousands of dollars in damage to your home. That's something most homeowners' insurance policies won't cover. Experts say be sure to treat every hive as though it is an Africanized.

Denise Rosch, KVBC-TV 3 Las Vegas, 2-28-02).

Shipping queens is a sticky business

Using the mail has been a regular method of shipping bees in the USA, but recently there were fears that the transportation of package bees was likely to come to and end - at least in Georgia. This was very bad news for New England's beekeepers for, each year, they need to replace their winter losses with southern-bred bees. Although the US Postal Service has brisk business in moving bees, decisions are made regionally, allowing local managers to discontinue the service should they want to and some seem to have done so. Their reasons are two-fold. Firstly, they do not like to be responsible for the welfare of the bees as many can die before they reach the end of their long journey. Secondly, there is the cleaning up of the trucks afterwards. "Last year, it was a horror," said Tracey Peugh, Manager of South Georgia US Postal Service. "We had to steam-clean the trucks and too many bees were arriving dead." Because of the mortality rate most postal services will only accept liability for package bees upto a travelling distance of 600 miles, so transportation is at the beekeeper's own risk. The mess in the trucks is the result of spilt syrup from the packages - but the beekeepers insist that this is the fault of the post office. A major supplier from Georgia, Reg Willbanks, was scornful of the postal service and stated "A spill will not occur if the employees would read the packages that said 'This side up'. He stood to lose $70 000 -$100 000 if the ban (imposed last October) was not lifted. Like many Georgia bee suppliers he was incensed by what he thought was so unfair. Although California doesn't allow shipments of bees up to New Engand, his competitors in both Florida and Texas would continue to trade.

(Information from Boston Globe, 18th February, 2002)

Post Script

R. Wayne Graves, the postal service's manager for rules and classification, overturned the order, thus saving the practice of mailing bees.

Exeter Bee Supplies taken over and re-named National Bee Supplies

Bill Stevens, a south Bedfordshire bee farmer running 130 hives, and his wife Paula, have taken over Exeter Bee Supplies, following the untimely death of its founder, Bill Smith, who started the company twenty-one years ago. The couple are re-naming the firm "National Bee Supplies" and will continue to employ the company's two workers. Bill says that for this trading year the prices of goods offered will remain unchanged, the company thus holding the same prices for three years.

Bill and Paula Stevens

Working smarter, not harder

Apicultural productivity in the 21st century

Dr. M.T. Sanford

Beekeepers all around the world are always asking how they might increase the honey bee's productivity, generally measured in honey yield. Giving specific counsel is often hard to do; the bees are already pretty good at this, having millions of years of experience built into their genetic code. The core issue it seems to me is that the beekeeper's and not the bees' productivity is where the emphasis should go to improve an outfit's overall performance. Fortunately, apiculturists can take a page out of the book of many other agricultural activities that are reinventing themselves in the 21st century. This invariably means working smarter, not harder to increase both productivity and profitability by taking advantages of new forces and technologies in the modern agribusiness environment. At the same time, beekeepers should not forget their principle role, to help honey bees better use their built-in genetic mechanisms that have helped these insects weather the forces of nature for millennia.

An article in the March 25, 2000 issue of The Economist comes to mind (1). Mr. Shereen El Feki has written a superb piece on Agriculture and Technology that emphasizes many key issues affecting agriculture, and by implication, apiculture. Agriculture, according to Mr. El Feki, is one of the world's largest industries, employing 1.3 billion people, producing $1.3 trillion worth of goods each year. Production per head has gone up 25 percent over the last 40 years. Food prices have fallen by two-fifths. Rich consumers in the U.S. spend only 14% of income on food. Modern agriculture is shaped by many of the same technologies transforming other industries, but is subject to unique constraints. It is expected to produce an abundance of cheap food, but at the same time take account of environmental concerns, look after rural landscapes and the welfare of animals, as well as health of consumers.

Agribusiness, a relatively new term coined in the 1950s, used to be an orderly chain of companies and institutions, Mr. El Feki says, stretching from input supply (seeds, fertilizer, etc.) to food processors and retailers. Family farms were integral to the process. But global competition and new technologies are developing new relationships, transforming this chain into a more complex web. Farming in rich countries is moving from bulk-commodity industry to "botique agriculture," which produces highly specialized goods. This is the idea behind what some have called the "end" of agriculture in the U.S., which probably simply means a transformed activity that doesn't bear much resemblance to the agriculture of old (2). Consumers are becoming more demanding as well, and companies are consolidating in pursuit of new efficiencies and economies of scale. The trend is most obvious, Mr. El Feki concludes, at both ends of the food chain: seeds and supermarkets.

Given the set circumstances above, the beekeeper too can now analyze his or her operation to take advantage of the new agribusiness environment. This fits into what is being called the "futuring process," which includes a discovery phase characterized by generally using information from outside one's field. An example of this is employing ideas generated from the NASA space program to enhance apicultural productivity (3). The following are some possibilities for beekeepers to consider:

1. Produce and sell other products and services besides honey:

This is perhaps one of the most important mindsets that can be changed in apiculture. Other products can be more profitable as they don't fit into the bulk-commodity category where there is a lot of competition. These include beeswax, pollen, propolis, royal jelly and even venom. New product research may reveal some interesting options in the future. Mr. El Feki mentions vaccines from genetically-modified potatoes, therapeutic proteins from goat's milk and plastics from maize among others. The challenge here is to take a close look at one's operation and find those areas of most profit potential that are not being utilized. This includes examining the marketplace as well as the production mechanism and costs (4). Services, too, can be part of the mix, especially pollination (5). Many of these variables can be put into decision-making models (6).

2. If honey is to be produced and sold , determine how specialty varieties and certain types can increase profit potential:

These honeys include unifloral sources, sweets with special qualities (exotic flavors, antioxidant (7) or medicinal (8) properties). These are the "boutique" products Mr. El Feki discusses. An important point, however, with these and most products and services is that we are in an age when information is the currency (9). Thus, products are only as valuable as the information they convey to the consumer (10).

A prime example of this is the "organic" label (11). The world market in organic produce is growing steadily, according to Mr. El Feki, and expected to reach $20 billion this year. What information the organic label is to bear is one of the most intriguing and frustrating issues facing regulators (12). The bottom line may be to simply state what one means by organic on the label, rather than waiting for official regulations on the issue (13). For example, according to the California Certified Organic Farmers (CCOF), "organic produce is the end-product of an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and management practices that restore, maintain and enhance ecological harmony (14)."

3. Pricing the product is as important as producing it:

Beekeepers cannot set world honey market prices, even though they have been able to influence them by legislative action on occasion. These kinds of actions can cause dislocations, however, that may destabilize the market and possibly the industry (15). Prices at the local level, however, are a different story. Thus, the general advice for beekeepers to concentrate on opportunities found in the local market is well founded. This is particularly true in developing nations, where often the first idea that comes to mind to export honey is misguided, as domestic demand is often much stronger,

resulting in higher prices at home (16). This may also be true in regional markets of affluent nations. There is some reason to believe, for example, that sale of adulterated product in the U.S. has proliferated in areas where the authentic honey is not available (17). Pricing is an art, and there is evidence that prices now no longer reflect true production costs, given supermarket consolidation, but are instead customer "value-based" (18). The general rule, therefore, is when in doubt to mark up the price on specialty products. This trend can be seen in everything from luxury cars to cruise line packages. Beekeepers have all too often gone in the other direction to their detriment.

4. Deploy value-added products in the marketplace:

Beyond specialty honey types and other traditional bee products, those with value-added characteristics can be examined (19). The National Honey Board has been a leader in this activity over the years and continues to expand its effort in helping food technologists develop products that use honey (20). These include potato chips, spreads, meats and drinks. The Board also publishes information on food shows around the world and encourages beekeepers in a number of ways to niche market their own products (21). Value-added products are a valuable part of the vertical integration of any beekeeping outfit. Vertical integration is also something being employed by large agricultural concerns. It allows companies to match technological developments upstream to consumer demand downstream, according to Mr. El Feki. It also helps companies control hygiene more rigorously, something, beekeepers may also turn to their advantage (22). Small-scale vertical integration is perhaps best illustrated in beekeeping outfits in Europe. French beekeepers routinely promote their own product and sell not only honey, but mead, nougat and spice bread made with that honey (23). They are also banding together in regional efforts to promote their products and services, most notably pollination (24).

5. Use contracts and cooperatives to reduce risk:

There is no formal futures market in honey or other bee products, but risk can be examined and minimized in a number of ways. Forward contracting is certainly possible on a small scale for beekeepers, especially since some bee products can be stored for relatively long periods inexpensively. Many farmers like contracting, Mr. El Feki says, because it pays well and reduces risk. For young producers and those in poorer countries it can offer both capital (credit) and access to new technology. This also can help timing production and supply, although Mr. El Feki doesn't see "just-in-time" agribusiness any time soon. Among those who don't want to get out of farming, many are turning to the time-honored cooperative for help, according to Mr. El Feki. These organizations fell out of favor for a while, but are now reinventing themselves as vertically integrated production-to-processing operations. Their advantage over private companies, Mr. El Feki concludes, is they offer farmers a greater stake in the business by harnessing their loyalty (25).

6. Take advantage of the Internet and other digital technologies:

The World Wide Web, according to Mr. El Feki, offers a way for many small-scale producers to become connected in a number of ways to suppliers and customers never before available (26). It also offers a way to get research information quickly and reliably, something larger operations pay for through use of professional consultants. So-called "agr-e-business" could be responsible for 10 percent of the world's $4 trillion agricultural commerce as early as 2004, Mr. El Feki concludes, quoting from figures provided by Rabobank (27). We can expect to see a proliferation of portals in many languages as part of this movement (28). Other technologies include computer monitoring of everything from water to nutrient applications. Mr. El Feki discusses one company that markets programs to check the vital signs for plants (29). Others using similar technologies include Dr. Jerry Bromenshenk and colleagues at the University of Montana with their computerized observation hives (30) and Mr. Claude Ivert, a beekeeper living in Puyricard, just outside Aix-en-Provence in southern France who is actively monitoring his hives electronically (31).

Another manifestation of digital technology is what is called precision agriculture (32). A main feature of this is digital mapping using Global Positioning Satellites or GPS. Precision agriculture, however, comes in many forms, according to Mr. El Feki. Some is the stuff of NASA, implemented as Project Common Sensing, a joint project designed to educate the farm community on the realities of remote sensing for agriculture. "Here on the web page we will follow a NASA precision agriculture project with Ken Hood Farms for a cotton field in Mississippi from bare soil to harvest. The project will be using remote sensing and other new technologies to assist Mr. Hood in his agronomic decisions" (33). Remote sensing is used to analyze the spectral range of plants. These can indicate many things, including the amount of chlorophyll or water in a plant to the environmental stress it might be under.

7. Monitor new technologies:

These include things like the use of genetically-modified organisms (GMOs)34and integrated pest management or IPM35.. Already the latter is part of the beekeeper's arsenal against the dreaded Varroa mite. It uses a range of control measures, including both chemical and physical techniques (36). There continue to be questions about GMOs and there effects on everything from human consumers to honey bees that forage on them (37). however, the tendency to pit the defenders of the technology against the champions of nature, as if there is only one road to increased agricultural productivity and sustainability, is "clearly nonsense," Mr. El Feki concludes.

8. Exploit the honey bee's genetic and protective mechanisms already in place:

Genetically engineering the honey bee using modern molecular biology techniques is a long way off. However, the insect has many built-in features that can be taken advantage of to help increase productivity and avoid problems. One is hygienic behavior, something a good deal is known about, but not being employed extensively by beekeepers (38). Besides this trait, bees have others that protect them. Specific recommendations that assist beekeepers in keeping healthy bees using these characteristics have not changed much over time:

A. Select and breed bees that have the necessary defense mechanisms already in place. Regular requeening with locally-selected stock is key. In the vast majority of cases, it is important to recognize that bringing in stock from elsewhere is a prescription for not only for failure, but in many cases disaster (39).

B. Ensure the environment provides enough of the right food for bees. If not, then the beekeeper must feed both carbohydrate (sugar) and protein (pollen substitute/supplement). The Australian use of protein monitoring using modern laboratory methods is one use of new technology (40). This was pioneered by Graham Kleinschmidt, but the idea of protein deficiency was also a concern of other experienced beekeepers, including the late Andy Nachbaur (41). Beyond protein and carbohydrate, good locations must also provide all-important clean, fresh water for bee colonies.

C. Determine the beehive is the right size with reference to colony size and management practices. Establishing artificial swarms that build new combs and uniting young colonies with older ones established the year before ensure rotation of bees and wax. Routinely replacing old combs is something every beekeeper should consider. This is especially important considering how colonies over time can bioaccumulate all kinds of environmental contaminants (42).

A recent concept is the idea that changing the bees' cell size through appropriate technology (adjusting foundation cell size) may help the insect in several ways (43). This is highly controversial at the moment, but is another example of the possible use of the honey bee's own genetic code.

D. Reduce stress on colonies. There is evidence that extensive manipulation and moving colonies, especially now with chronic use

of pesticides in North America are all pushing colonies to their limit (44).

E. Keep bees without using drugs. Medical treatment of a colony will interfere with the natural defense mechanisms discussed above. This is especially true for antibiotics, which cannot eradicate infections, but only mask symptoms, leading to sometimes huge reservoirs of disease ready to break out at any moment. American Bee Journal, June, 1993, pp. 431–434 (45).

Many of the above, of course, are used by default in countries which don't have the many resources to put into beekeeping. The advent of the African bee in the American tropics, with its superior adaptation to that kind of climate, has shown that leaving the bees to their own devices will often result in improved productivity. The only wild card in the mix may be the Varroa mite, a pest for which many honey bees simply have no innate defense. Even this parasite, however, is tolerated by certain honey bee populations (46).

9. Realize that there is no single solution to resolve the productivity issue: As Mr. El Feki says, "In farming, there is no single way to salvation. Different circumstances will require a combination of different tools." This goes doubly for beekeeping, where many of the necessary inputs cannot be controlled as in other branches of agriculture. What farmers want, Mr. El Feki says, are not solutions imposed by government ministries, but a way of harnessing their experience and initiative to come up with local solutions, which need not be fancy. As an example, he gives the case of Mongolian cattle herders whose cattle were mating at the wrong time. Foreign-aid agencies suggested artificial insemination, but semen was hard to collect and did not store well. Farming practices elsewhere, however, provided the answer; forked sticks around bulls' necks to keep them off females. Innovation, Mr. El Feki says can take many forms; agriculture, he concludes, cannot afford to ignore any of them.

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42. http://www.ifas.ufl.edu/~mts/apishtm/apis94/apmay94.htm#3
43. http://www.beesource.com/pov/lusby/index.htm
44. http://www.ifas.ufl.edu/~mts/apishtm/apis98/apfeb98.htm#4
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Trespassers in the hive

Some time ago Matthew Allen had photographs printed in Bee Biz of creatures that sheltered in or took over honeybees' hives. Whilst keeping bees in the UK I came across the odd mouse but also lizards when the apiaries were on sandy heaths. Wasps were common too, especially in double-walled hives in need of repair, where the wasps built their nests in the space between the two walls. Please send the editor any pictures you have of trespassers in your hives - or apiary.

As this is an international magazine, with readers help, we should be able to print some fascinating pictures. Send by post or email - but if digital files are sent please ensure that they are saved at 300dpi in greyscale JPEG format.

The varroa mite: a cure in sight

Rosalie Smith, New Zealand

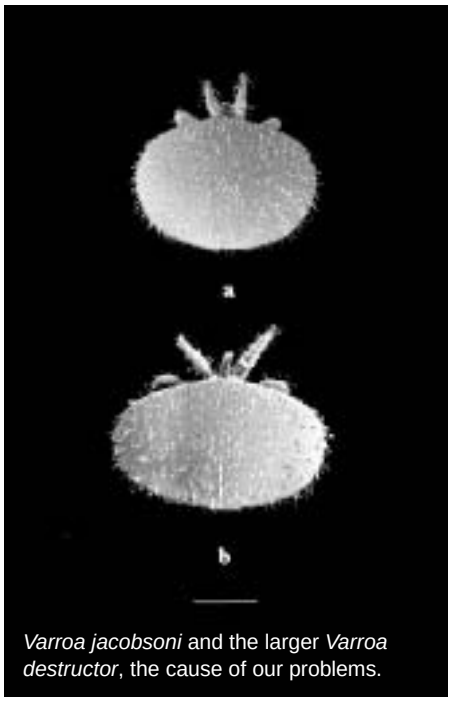
Dr Denis Anderson of the Commonwealth Scientific Industrial Research Organisation (CSIRO) at Canberra, Australia, believes he is not too far from identifying bees which are totally resistant to the varroa mite.

The varroa mite has not yet reached Australia, but it is present in neighbouring New Guinea. Since 1989, Dr Anderson has been studying the mite in New Guinea and other regions in order to acquire knowledge that can be used to control it better, if and when it arrives in Australia.

At the time Dr Anderson began his work in New Guinea, the varroa mite had infested European honey bees (Apis mellifera) almost world-wide, after it had switched-host from its native Asian bee host (Apis cerana) some 50 years earlier. This particular mite was also thought to be the same as that first found on Asian bees in Java in 1904 and which was named Varroa jacobsoni. In the years following its discovery in Java, mites resembling the Java mites were also found on other populations of Asian bees throughout Asia. The mites that Dr Anderson studied in New Guinea were descendants of the original Java mites, as they were introduced to New Guinea during the 1970's on Asian bees imported from Java.

Dr Anderson and his co-workers monitored the mite in New Guinea for 4 years and found it could spread from the Asian bees to European bees, but once there, it could not reproduce. They then checked on the mite in Java and found the same situation there. These observations could not be explained from what was known about the mite in other regions of the world. There were three likely causes:

- the local European bees in Java and New Guinea were totally resistant to the mite
- the mites' ability to reproduce on those bees was impaired by unique environmental factors (such as heat, humidity etc)
- the mites in Java and New Guinea were genetically different from those affecting European bees in other parts of the world, even though they looked the same.



Varroa jacobsoni and the larger *Varroa destructor*, the cause of our problems.

To find out whether the European bees in New Guinea were resistant to Varroa mites, Dr Anderson raised 40 sister queen bees in Australia and moved half to New Guinea and half to Germany (where varroa mites were reproducing on the local European bees). The mites did not reproduce on the brood of the queens sent to New Guinea, but in Germany the local mites readily reproduced on the brood of the imported queens. This indicated that it was not the bee that made the difference in New Guinea; it must either be the environment or a different type of mite.

In 1993 a change in the behaviour of the varroa mite in Java was noted. It began reproducing on the European honey bee, initially only in one small location. This reproducing mite looked like the non-reproducing one except for its size: it was much larger. Closer observations showed that the smaller non-reproducing mites and the new larger reproducing mites were present in the same European bee colonies, with the larger mite being more predominate. This indicated that the larger mite had been recently introduced into Java. It also indicated that the reason for the smaller mite being unable to reproduce on the European bee was not environmental, but must have been due to a different type of mite. Dr Anderson then looked at the DNA of the two mites, the larger and the smaller, and found their DNA sequences were miles apart.

To understand what the differences in DNA meant, Dr Anderson took a Darwinian approach - he looked at the mites infesting Asian bees, which are the mites' natural hosts. He reasoned that, because the Asian bees and varroa mites had been evolving together for many thousands of years, he should be able to find the full extent of genetic variation in the mite. He collected mites from these bees in many parts of Asia and looked at their DNA. He found two distinct species. He was able to redefine Varroa jacobsoni as consisting of several strains which were parasites of different strains of Asian bees throughout the Malaysian and Indonesian archipelago. He named the other Varroa destructor and found it included several strains which were parasites of different strains of Asian bees throughout mainland Asia. He also isolated three other unique mites in the complex from different islands in the Philippines, but did not give them names. In total, he found close to 20 different mites in the complex.

Next he had to find which mites were present on European honey bees world-wide. He collected mites from 32 countries and found they were all Varroa destructor, and not Varroa jacobsoni as had been assumed. Even more remarkable, he found that European bees world-wide were affected by only two strains of the destructor mite. These were the so-called 'Korea strain', which was exactly the same mite he found on Asian bees in Korea, and the so-called 'Japan/Thailand strain', which was exactly the same mite he found on Asian bees in Japan and Thailand.

"These findings were simply amazing" said Dr Anderson. "First, what we thought was a single mite on Asian bees turned out be a complex of nearly 20 different mites. Second, of those 20 or so mites, we found that only two have switched host from the Asian bee to the European honey bee and become serious pests of that bee. These two mites do not belong to the species they were thought to belong to, but instead are members of a completely different species which we have named Varroa destructor."

"So the next obvious question is, 'Why have only two of the 20 or so mites in the complex become pests of the European bee?' We now know from our studies in New Guinea and Asia that the answer to this question is that the other mites in the complex completely lack the ability to reproduce on the European bee." Dr Anderson believes that finding the reason why those mites cannot reproduce on European bees could present a cure for the varroa problem world-wide.

"If we can find the chemical signal that enables the two strains of Varroa destructor to begin laying eggs on the European bee then we can breed or produce European bees with chemical signals that those two mites cannot recognise."

Dr Anderson elaborates. "The varroa mite does not have eyes to locate individual bees and it can't walk over the ground to invade neighbouring bee colonies in which to feed and breed. Instead, it relies on bees to move it around the environment. Being a true parasite, it is also totally dependent on its bee host for its food and reproduction and gives nothing back to the bee in return. To exist like this, it is necessary for the mite to recognise particular chemical signals that are given off by the bee. These signals tell the mite how and when to act, such as, how to locate bee larvae on which it can reproduce, and when to commence laying eggs. When a mite recognises a particular host signal it instinctively carries out the behaviour that the signal triggers. The mite has no choice about this."

"The reason why a particular mite behaves differently on a different strain or species of bee is that it has evolved and developed its signal-receptors on a particular strain of bee, and therefore only recognises the chemical signals given off by that bee. Different strains or species of bee may give off slightly different chemical signals - either the chemicals differ in their physical structures or, more often the case, the chemicals are released at different concentrations and in different 'time-frames' on the different bees. A signal has to be only slightly different or be released at a slighty different time for a mite not to recognise it, or to respond to it differently."

"When a mite of the so-called 'Korean strain of Varroa destructor' jumps onto a European worker bee it recognises that bee as a suitable host - in other words, it has recognised particular chemical signals on that bee as being the same or similar to those that are present on its native host strain of Asian bee, in this case, the Korea strain of Asian bee. The mite then responds to other chemical signals to find its way to the European bees' brood and enters a brood cell just before it is capped. Again, it can do this because it has recognised particular chemical signals as being the same or similar to those on its native Korea strain of Asian bee. About 72 hours after it enters the brood cell, the mite lays its first egg, but only after a meal. So the chemical signal that triggers the mite to begin laying eggs on the European bee must be the same or similar to that which the mite recognises on its native Korea strain of Asian bee. We now know that the majority of mites in the varroa complex do not recognise that particular signal on the European bee and hence do not reproduce. In other words, the egg-laying signals that those mites respond to on their own particular strains of Asian bee must be different from that released by the European bee."

"This chemical signal is likely to be a bee hormone. It is hormones that control the on and off switch of genes. If the hormone is not in the right concentration, or if it is not present at certain times then the 'window-of-opportunity' for the mite will be closed."

"Once we find this signal, we will have to find out how it switches-on reproduction in some mites but not in others. Then we will have to assay a wide population of European bees with regard to their patterns of signal release and find those that do not allow Varroa destructor to switch-on its reproduction. We must find bees that can maintain their resistance to Varroa destructor over many generations and use those bees to breed totally resistant bees."

"Sorting out the taxonomy (defining the species) has been the crucial step in the research. We can see our way forward now."

late news

Prevention of residues in honey

Symposium - 10 and 11 October 2002, Celle, Germany

Apimondia International Honey Commission/Niedersächsisches Landesinstitut für Bienenkunde

Diseases and parasites are causing major problems in beekeeping all over the world. With the spread of parasites and bee diseases the use of antibiotics and pesticides has become widespread and in many areas a recommended practice.The problems caused are growing difficulties with resistant strains of disease causing agents and parasites. Problems with residues of the antibiotics and pesticides are In many countries there is a growing concern among consumers over the residues of these products in honey, which is looked upon as a natural and clean health product. To keep this reputation beekeepers must produce honey without residues. In EU there are no maximum residue levels for antibiotics in honey. Basically, honey with residues of antibiotics is illegal to sell in the market.This symposium is meant to discuss the research, the need for action, the legislation and the possibilities to prevent residues. Participants should be researchers, legislators, administrators, veterinarians, advisors dealing with bee diseases and honey traders involved in international honey trade.Looking forward meeting you in Celle 10 - 11 October.

Asger Søgaard Jørgensen
President of APIMONDIA

Organizer

Wolfgang Ritter, Apimondia Pathology Commission at CVUA, Freiburg Germany

Werner von der Ohe, Niedersächsisches Landesinstitut für Bienenkunde, Celle, Germany

Organizing committee

Stefan Bogdanov, Swiss Bee Research Centre, Liebefeld Switzerland

Henrik Hansen and Camilla Brodsgaard, Danish Institute of Agricultural Science,Slagelse, Danmark

Cord Lüllmann, Institute for Honey analysis, Bremen Germany

Agenda

Residues in bee products

- Analysis of the situation in the most important export countries
- Requirements and standards of the EU

Prevention of residues in honey by alternative methods

- Varroa mite
- Nosema disease
- Wax moths
- Bee repellents

Control of AFB without the use of antibiotics

- Presentation of existing projects and models
- Discussion of the possibilities
- Possibilities with realisation of the measures

Methods to analyse residues in honey

- Standardisation
- Validation

Contact details

www.beekeeping.com/apimondia/manifestations.htm
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Beekeeping in Nepal

Jeetendra Lohani

Business Promotion Officer
Industrial Enterprise Development Institute(IEDI)

NEPAL is recognized as one of countries with massive potential for beekeeping due to its very rich and diverse flora and fauna in different climatic regions. It is estimated that Nepal has the potential for one million Apis cerena beehives - honey farming that could realise a production of 10,000 metric tonnes honey per annum. But, according to estimates from the entrepreneurs involved in this sector, the honey production in 1999/2000 was justabove the 200 metric tonnes However, it is increasing annually. Beekeeping is a traditional, cultural and timeless business which is getting more popular day by day among the Nepalese farmers. Due to its holistic benefits in terms of health, economy, employment, and environment, it can be regarded as a gainful subsidiary occupation for many people in an agricultural country like Nepal. It is also a way to earn supplementary income for the farmers, particularly the under-privileged, low-income groups as well as the female sector of society. Because of the rich flora available in the rural and forested areas, beekeeping can be done along with other farming activities or adopted as an off-farm employment. Hive products like honey, beeswax, royal jelly and pollen provide nutrition, increased crop yield and income for the farmers.

The bees

Due to the prevalence of ecological and biological diversity within the country, 5 species of the honeybee among the 8 identified species in the world are found in Nepal, which are:

Apis dorsata (Giant bee)
Apis laboriosa (Rock bee)
Apis florea (Small bee)
Apis cenara (Asian bee)
Apis mellifera (European bee)

Among the above varieties of bees found in Nepal, Apis dorsata, Apis laboriosa and Apis florea are wild species which cannot be domesticated but the extraction of their honey is done and marketed by the famous and courageous Nepalese honey hunters and the honey produced from this source is named Natural High Mountain Rock Honey, which is famous in worldwide.

The other two species of bees, Apis cerana and Apis mellifera are domesticated commercially. The average annual production per hive of Apis cerena and Apis mellifera ranges between 8 - 20 kg and 40 - 60 kg respectively. In addition to the honey, different industrial and medicinal by-products such as pollen, wax, propolis etc. are also of commercial significance.

Potential producing areas and markets

The area which has the greatest potential and which is suitable for the mellifera bee is inner Terai and Terai such as Dang, Chitwan and Sarlahi, whereas the cerena bee is native to the middle hills of Nepal. Due to the higher productivity of mellifera, it is more popular hence, mellifera-keeping is expanding in different locations. The expansion is due to the rising trend in honey consumption - it is gaining popularity within the country, especially in the urban areas, and there is a good export market too.

Major export markets for Nepalese Honey are Japan, Korea, Hong Kong, Canada, Germany, Thailand, U.K. and Poland.

Major nectar sources in Nepal

Rapeseed mustard	Feb-March/Oct-Nov
Litchi	Feb - March
Orange/other citrus	March - April
Buckwheat	April/Oct - Nov
Pumpkin/Cucumber	June - Sept
Vegetables	Sept - Oct
Maize	July - August
Butter Plant (Churi)	July - Dec
Niger	Sept - Oct

Mandatory quality standard on honey in Nepal

Moisture	<23%
Ash	<0.5%
Sucrose	<5.0% in floral, <10% in other honey
Reducing Sugar	>65.0% in pure, >60.0% other honey
Fructose sucrose ratio	>0.95%
Acidity	<0.2%
Water insoluble solids	<0.5%
Hydroxy Methyl Furfural	<40 mg/Kg of honey

Market Trend Price

The retail price of honey varies from Rs. 200 to Rs. 360/kg at the retail counter. The bulk-selling price at the farmgate ranges between Rs. 80-120/kg.

Market Promotion

The high demand of honey in the international market and the potential for Nepal to produce as much honey of high qualityfor export, evoked AEC to consider it as a high value commodity and to support the production and marketing of honey on the international market. Honey can be one of the major exportable items of Nepal bringing in a large amount of foreign currency. Thus, AEC has been supporting the honey entrepreneurs of Nepal in the production and marketing of the produce. The direct involvement of AEC in the field of honey is as follows:

- Pocket Area development.
- Marketing management of produced honey.
- Provide training on marketing management and production of honey.
- Other technical support.

Key Processors/Traders

1.Dabur Nepal Pvt. Ltd.
Teenkune, Kathmandu
Ph: 478010/487672-5
Fax : 977-1-478030
E-mail : nepal@dabur.wlink.com.np

2. Stone Bee Concern
Satdobato, Lalitpur PO Box 309
Ph: 523853

3 Gandaki Bee Concern
Gongabu, Kathmandu
Ph: 353258/354093
Fax: 977-1-353747/355044
E-mail : business@mos.com.np

4. The Bee Keeping Shop
Kumaripati, Lalitpur
Ph: 537492

5. Garden Apiary
Narayanthan, Nayachowk
Kathmandu
Ph: 372872

6. Himalayan Bee Concern
Chovar Gate, Kathmandu
Ph: 330548

The evolution of Chinese apiculture

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In 1983, honeybee fossils were discovered in Beisozi, Laiyang City, and Shanwang, Linju county, in Shangdong Province. The discovery indicates that honeybees inhabited the temperate zone of eastern China more than 20 million years ago. The Chinese character 'honey' appeared in inscriptions on bones and tortoise-shells of the Shang Dynasty (16 thC -11 thC BC), implying that China has a 3,000 year-old history of apiculture. Through centuries of evolution and along with the improvement in production and scientific and technological progress, the apiculture in China has gradually formed its own character. Chinese apiculture began to enter a new stage of development after it introduced species of Western honeybees and began to use the movable-frame hives of today. Since the founding of the People's Republic in 1949, Chinese apiculture has undergone drastic changes and has made extraordinary achievements. Such changes and achievements have laid a solid foundation for the country to modernize its beekeeping industry.

Ancient Apiculture (16thC BC - 1840 AD)

China has a long history of ancient apiculture. To begin with, people relied on primitive ways of hunting to obtain products generated by wild bees before they learned to raise Apis cerana (Apis cerana cerana) and engage in the simple processing of bee products. Later, our ancestors realized that the dreadful bee stings could be used to cure certain diseases, thus inventing the ancient sting apitherapy. During those periods, the processing of hive-products and the application of sting apitherapy advanced faster than the development of apicultural technology. The scientific and technological progress of Chinese ancient apiculture can be roughly divided into three stages:

1. The Primitive Utilization of Bee Products

The realisation by human beings of the existence of honeybees and their making use of the wild honeybees' resources for their own benefit is an example of the progress of civilization. It also marked the beginning of apiculture on the planet.

Collecting honey, brood and beeswax

In primitive society, whilst gathering edible plants and hunting, our ancestors began to eat honey and brood collected from honeycombs in trees and caves, and depended on these items for survival. In order to harvest the honey and brood, they first destroyed honeycombs and burnt the honeybees. But later, they realized the reproductive capability of the bees, so they learned to use smoke to drive away the bees and preserve part of the honeycombs after collecting honey, wax and brood.

The ancient Chinese people developed some new skills during this period of honey collection. For instance, they used cattle dung to seal the entrance of the nest, leaving only a small pathway for bees. In addition, they made a mark on the tree where they had found a honeycomb so that they could regularly collect hive products from there. This demonstrated that the ancient people began to have an initial sense of beekeeping. Today, this honey collecting method is still employed by some minority people living in Yunana Province, in south west China.

2. From Taming Wild Bee Colonies to Household Beekeeping

The foundation for the development of China's ancient apicultural technology and the traditional methods of raising Apis cerana was laid down during the period when the management and raising of honeybees was gradually developed from the practise of collecting hive products from wild honeycombs

(a) Creation and development of beekeeping technology.

During the Eastern Han Dynasty (25 - 220AD.), some pioneers began the beekeeping business by chopping down tree branches which held honeycombs and hanging them under the eaves of their houses. This step provided the pioneer apiculturist with better opportunities to observe bee behaviour and to improve their methods of raising bees. Zhang Hua's "Bowuzhi" (220 - 581AD) and Zheng Jizhi's "Yongjia Dizhi" (420 - 479AD), describe that at that time honey and bees wax was smeared onto wooden boxes which were then hung under the eaves to attract wild bee colonies to settle down in them.

During the Jin Dynasty (215 - 282AD.), Huang Puming described a pioneer apiculturist, Jiangqi, in his book entitled "Gaoshi Zhuan". Jiang, living in the Han Dynasty, taught beekeeping skills to more than 300 people. As a result, of this, several thousand households began the business of beekeeping. Jiang's training programme was probably the first of its kind in China.

Ancient Chinese people had even recorded their observations of comb building and swarming of bees. In Guo Pu's "Mifeng Fu", there was an account of labour division amongst honeybees which indicated that bees were social insects.

At that time, people began to use wooden hives to lure wild bees, implying that household beekeeping had taken on its initial shape.

(b) Simple processing of hive products and expansion of their utilization.

In time, the country witnessed much progress in the application and processing technology of hive products. "Shengnong Bencao Jing" (c.1st-2nd century BC) told people that honey, brood and beeswax could be made into top-grade medicine. "Wu Zhi, Sun Liang Zhuan', written during the Three Kingdoms period (220 - 280 AD), describes people at that time using honey as a type of antiseptic to preserve fruit. Meanwhile, beeswax was used extensively,. It was first used for painting onto wooden shoes and for seals. In the Han Dynasty, people invented the wax printing technology and produced wax-printed silk products. Most of these products were presented to the imperial court as tributes. Even today, wax printing remains very popular in China.

3. Appearance of Apiaries

The constant development of apicultural science and technology eventually led to the appearance of apiaries.

(a) Progress of Beekeeping Technology

During the Tang Dynasty, apiculturist Duan Chengshi wrote a book entitled "Youyang Zazu". In the book, he described the biological characteristics of drones, saying they were black and usually born in March or April. In another book, "Sishi Zhuanyao", the writer Han E (900 AD) suggested that honey should be collected in June. During the Song and Yuan Dynasty (960-1368), breeding Apis cerana entered an important stage. There were records about beekeepers at that time fighting bees' enemies including spiders, ants, snakes, birds, bats and foxes. In addition, apiculturists then had invented some new beekeeping technologies. For instance, they used smoke, bait honey, blocking bee escape ways and other methods to collect wild bee colonies. They also used mint leaves to scrub their hands and faces and wore straw capes to avoid being stung. In 1819, Hao Yixing, a naturalist, wrote a bookcalled "Fengya Xiaoji" in which he recorded the biological characteristics of bees, the beekeeping technology and the experiences accumulated by apiculturists of that time, This book is now deemed China's first treatise on apiculture.

During this period, an average beekeeping household raised 10 colonies. In practice, the beekeepers had observed the insect in more detail and had conducted some scientific studies. During the Ming and Qing Dynasties, a few researchers had given descriptions about the four stages of the growth of a bee. In the Ming Dynasty, Xu Guangqi studied the relationship between rainfall, plants and honey production and summarized the rules for predicting a year's honey yield. Later, in the book "Zhifu Qishu" there was an account about the use of primitive supers in China. Pu Songling (1640 - 1715), a well-known scholar, wrote "Nongsang Jing" which told people when was the right time to divide a bee colony into smaller groups. In 1760, Zhang Zongfa pointed out in "San Nong Ji" that a newly-born queen bee should be separated from her mother bee. This was the first time that the sex of the queen bee was clearly indicated. By the end of the Qing Dynasty, the Apis cerana keepers had raised more than 200,000 colonies. Most of them were found in Zhejiang, Fujian, Jiangsu and Shandong Provinces, but they were also raised in Hebei, Jilin, Guangdong, Guangxi, Sichuan and Guizhou. Each colony yielded an average of 5 kg of honey and 0.3 - 0.5 kg of beeswax each year. The development of apicultural science and technology at that time laid a solid foundation for the introduction of Apis mellifera and the movable-frame hives into China in the1930s.

(b) Development of hive-products

Utilization of bee products reached a rather high level during that period for bees were used extensively during the Tang Dynasty. The frescoes found in Tang tombs in Shaanxi Province revealed that people then used beeswax to make candles. Even poems written at that time often mentioned beeswax candles: some even described the process of making candles from beeswax. However, such products were supplied exclusively to the royal families. Beeswax was also used for preserving books, painting and medicine production. Later, people learned to make honey wine. Sun Simiao (581-682), a famous Chinese medical scientist, left behind an account about how to brew honey wine. After the Tang Dynasty, people from noblemen to commoners all began to use pollen both as a delicious food and as a natural cosmetic. Since the Song Dynasty, pollen was also used to preserve fruit. In the Ming Dynasty, a great medical scientist demonstrated in detail in "Bencao Gangmu" the nutritional and medical benefits of bee products including honey, brood, beeswax, and pollen. Also in the Ming Dynasty, Fang Yizhi (1611- 1671) described using bee stings in "Wuli Xiaoshi" indicating that apitherapy had reached an interesting stage by then.

Modern Apiculture (1840 - 1949)

The introduction of Western culture and new technology into China in modern times led Chinese apicultural pioneers to import Apis mellifera and moveable-frame hives. This marked a new and important stage in the development of Chinese apiculture.

1.Introduction of Apis mellifera and Hives with Moveable Frames

For centuries beekeepers raised Apis cerana. In 1896, however, people living in the border areas of north east China began to adopt Russian Black Bees and moveable-frame hives. The bees were called North East Black Bees. According to the "Annals of Zhuhe County", after the first railway in that area was open to traffic, many Russians brought their bees to Harbin, which led to the only booming household business along the railway line. After the Russian invasion into Xinjiang in 1900, the followers of the Orthodox Church also brought the black bees into Yili and Artai areas. They are now called Xinjiang Bees. However, these two kinds of black bees failed to spread to other areas. A Chinese envoy in the United States brought back five colonies of Italian bees to be raised in his garden in Hefei, Anhui Province. However, because of poor beekeeping skills, the five colonies never found the chance to affect the development of apiculture in China.

The real trailblazers in terms of introducing Apis mellifera and movable- frame hives into China were a small number of beekeepers including Zhang Pinnan in Fujiang Province, Hua Yizhi and Feng Huanwen in Jiangsu Province, Huang Zigu in Beiping (Beijing) and Wang Boya in Hebei Province. Those apiculturists made great contributions to the development of China's modern apiculture. They introduced Apis mellifera and established commercial apiaries, In 1911, in cooperation with others, Zhang Pinnan set up the "San Ying apiary" in Fujian Province. In the following year, he went to Japan to learn about movable-frame hive technology. In 1913, Zhang brought home four colonies of Italian bees as well as some comb foundation, honey extractors and apicultural books. Being one of the pioneers of China's modern apiculture, he devoted all his life to the study and spread of the technology of movable-frame hives.

The Experimental Farms in Tianjin and Beijing introduced Apis mellifera in 1914 and 1917, separately. Later, they introduced the bees to other areas of North China.

In 1918, Hua Yizhi, from Jiangsu Province, visited Japan and brought back 12 colonies of Italian bees. Three years later, he again imported 5 colonies of pure-bred Italian bees from the USA. He even bred queen bees from the pure-bred bees and improved the quality of his colonies.

Thanks to those pioneers' advocations, China imported nearly 300 000 colonies of Italian bees from Japan during the 1928 -1932 period. Out of this total, North China alone introduced 110 000 colonies in 1930. Most apiaries at that time became engaged in breeding colonies and producing good strains of bees. In the mid-1930s, Beiping's Liliyuan Queen Bee Apiary exported 1000 queens each year to other parts of the country. Taiwan, Nanjing and Beiping were regions way ahead in introducing Apis mellifera and spreading the moveable-frame technology. Taiwan province started to introduce Apis mellifera as early as 1895 and there were 15 500 colonies by 1919. In 1923, Nanjing had only 20 colonies of Apis mellifera, but the figure catapulted to 2 000 in 1930.

The Beiping-Baoding beekeepers also imported bees and had 16 000 colonies of Apis mellifera in 1929.

With the spreading of Apis mellifera and the new technology, large scale and specialized apiaries became established. When Beiping Lilinyuan Apiary was launched in1925, it had only 7 colonies of Apis mellifera. but, four years later, it boasted more than 300 colonies and produced 15 tons of honey every year. The apiary also owned an apicultural appliance factory, a queen bee farm and published beekeeping magazines. Hua Yizhi beekeeping Company was established in Shanghai in 1921. In the next year, the firm built seven bee transportation boats to move the colonies to suitable places along the lower reaches of the Yangtze River according to the season. An average colony of the firm yielded more than 50kg of honey each year, a record high in China's apicultural history.

2. Modern apicultural research and education and the appearance of apicultural society

The introduction of Apis mellifera and the moveable-frame hive technology accelerated the growth of research, education and the formation of an apicultural society. In 1926 Huang Zigu set up a beekeeping equipment factory in Beijing and successfully produced China's first wax foundation for Italian bees. In 1930 the factory also turned out Apis cerana comb foundation. Later, it succeeded in developing more than 40 new types of beekeeping equipment. In 1928, Wang Baoya, in Hebei Province, created a special type of hive for breeding Apis cerana, which is still in use in some areas of China. Some people had even exported such hives to Vietnam and Korea. In the late 1920s, a number of institutions of higher learning such as the Shanghai Labor University, the Nanjing Central University, the Zhejiang University and the Wuxi Education College had all introduced beekeeping classes. In 1931, Jinan, in Shandong Province, set up a women's apicultural school and the Hua Yizhi Beekeeping Company also inaugurated a beekeeping school. In 1934, Guangdong Province had set up an Apis cerana research institute, the first of its kind in China. Meanwhile, the state and local governments, various associations and large apiaries had organized training centres and programmes. So, in the early 1930s, a craze for learning beekeeping skills swept across the country. Moreover, in April 1929, the North China Apicultural Association was set up in Beijing; in 1931, the Hunan Apicultural Association appeared in Jinan, Shandong Province; and in 1932, the Hunan Apicultural Association was established. At the same time, Zhang Jubo, a pioneer Chinese entomologist, set up the China Apicultural Improvement Society. Most of these social organizations made great contributions to the development of China's modern apiculture by spreading movable-frame hive technology, by providing fine breeds, by offering technical guidance, through co-ordinating government-beekeeper relations and the publishing of periodicals. In 1917, Qi Xiupu wrote a book entitled "Tips on Beekeeping". "The New Book of Practical Apiculture", translated by Shen Huakui and "The Modern Experimental Apiculture", jointly translated by Gu Shuping and Hua Tang, the first of their kind in China, were published in !929. Also in 1929, Niu Xianzhou compiled "Apicultural Science" which was the first textbook on movable-frame hive technology in this country. Again, in the same year, Zhang Pinnan authored "A Summary on Apiculture" and Zheng Li and Jiang Sheng jointly wrote the "Complete Book of Apiculture". Other important publications included "About Beekeeping" (Xu Zhengkeng, 1925), "Apicultural Know-How" (Liu Yuchu, 1926), "Modern Apiculture" (Feng Junqing, 1929), "Experimental Apiculture" (Feng Huanwen, 1930), and "Raising Apis cerana" (Pan Zhinong, 1940). In 1920, Zhang Pinnan published the "Chinese Apicultural Magazine", the first of its kind in China. In 1934, Huang Zigu became the editor-in chief of "Chinese Apiculture" magazine, which is still around today. All these treatises and magazines facilitated the development of China's modern apiculture.

3. Grave Setbacks in China's Apiculture

During the late 1920s and early 1930s, while introducing Apis mellifera and the moveable-frame hives, most apiaries were set up in cities far away from nectar resources and bee migration areas. Because of these disadvantages, coupled with the spread of brood diseases, apicultural production experienced big ups and downs between 1931-1934. This started in North China and then the whole of Chinese apiculture nosedived into a deep depression. In Nanjing there had been adopted a series of steps including promulgating "Provisional Rules on the Examination of Farm Product Pests", "Rules on Honeybee Breeding", "Rules on the Registration of Apiaries" "Rules on the Examination of Imported Bees" and other relevant regulations. In addition, the tax rates were lowered, and the transportation fee for beekeepers to move their colonies according to seasonal changes was cut down. Meanwhile, some local governments, such as those in Shandong, Hebei and Hunan Provinces, had also made some efforts to rejuvenate the local apiculture. Most of these measures paid off later. However, after 1937, the Japanese invasion and the continuous civil wars had impeded the development of China's apiculture. In 1949, there were only 500,000 colonies of domestic bees, including 100,000 colonies of Apis mellifera and 400,000 colonies of Apis cerana. The country's total honey output stood at 8,000 tons. It was not until the founding of the People's Republic that China's apiculture began to enter a rapid development stage.

Contemporary apiculture (1949-1991)

The development of China's contemporary apiculture can be roughly divided into three stages: the recovery stage in the 1950s, the marked improvement stage in 1960s and 1970s, and the fast development stage since the1980s. Despite some difficulties and twists, China's apiculture has achieved great successes since 1949. Now, under the guidance of the state policy of reform and opening to the outside world, the country's apicultural industry is steadily moving in the direction of high quality, high yield and high efficiency.

I. Apiculture in 1950s

In the 1950s, China formulated a number of basic principles to gradually restore apicultural production. After the founding of the People's Republic, the state paid due attention to the development of apiculture, which was regarded as one of the country's traditional sideline productions in the rural areas.

(a) Establishment of an apicultural production management system based on collectively-owned apiaries.

In the process of unfolding the socialist reforms in urban and rural areas, the co-existence of individual, collective and state-run apiaries had come into being. According to incomplete statistics from 16 provinces, in 1956 there were 350 000 colonies of honeybees. Of this total, 150 000 colonies (42.9%) were owned by individual apiarists and 160 000 colonies (45.7%) per cent) were collectively-owned apiaries; and 40 000 colonies (11.4%) were raised by state apiaries. The Jiangxi Breeding Apiary was then the largest state apiary in China. It had 9 200 colonies of honeybees. Other state apiaries which each owned more than 1 000 colonies included the apiary of the Hangzhou Dairy Company in Zhejiang Province, the apiary of Jinshui Farm in Hubei Province, and Dongjun Apiary of Chengguan Commune in Shandong Province. Most state and collective apiaries moved their colonies a long distance to seek plants in flower and the average annual honey output of a colony exceeded 50 kg. These apiaries played an important role in revitalizing China's apiculture in the 1950s. In small apiaries, each beekeeper took care of about 30 colonies and the average annual output of each colony ranged between 10 to 15 kg.

However, during that period, most apiaries produced only honey and bee wax. It was not until 1958 that a few provinces and municipalities, such as Shandong, Jiangxi, Zhejiang, Shanghai and Beijing, and the Apicultural Research Institute. under the Chinese Academy of Agricultural Science, began to produce royal jelly, propolis and venom on a trial basis.

(b).Improvement of the leadership and management.

During the 1950s Apis cerana was in short supply on the market. At home, honey was used mainly for medicine and the bottled honey was very hard to get in the market. So, the Ziyunying brand, bottled honey produced by the Shanghai Guanshengyuan Food Factory, was sold like hot cakes all around the country. To tighten the control of the market, the honey purchase and allocation were put under a planned mechanism. In 1954, the state listed honey as a Grade II commodity which was put under the unified control of the commercial, supply and marketing departments. However, along with the development of apiculture, the country's output of honey products had increased by big margins. In 1958, it reached 12,300 tons. That was the first time that the output of China's honey products had exceeded 10,000 tons.

China started to export honey in 1956. In that year, China exported 3,900 tons of honey and the figure edged up to 4,200 tons in 1959. The ever growing demand in the 1950s had spurred the expansion of apicultural production. In 1949, there were only about 500,000 domestic colonies in the country which turned out just 8,000 tons of honey. But the number of domestic colonies jumped to 1.35 million in 1956 and 1.5 million in 1957. Though there are no state statistics available, it was estimated that the number exceeded 2 million in 1958 and 1959, more than four times that of 1949.

In order to strengthen the leadership and management of the apicultural industry, the relevant state departments had adopted a number of major steps. In 1950, the Ministry of Agriculture appointed special personnel to take care of the country's apiculture. In February 1957, the national agriculture exhibition displayed for the first time, all kinds of beekeeping equipment and apicultural publications from some beekeeping farms such as the Jinsbui Farm in Hubei Province, the Jinzhou Animal Husbandry Farm in Liaoning Province, and the First Farm of Luda (today's Dalian).

In October 1957, a national symposium on apiculture was jointly held by the Ministry of Agriculture and the Ministry of State Farms. In January 1958, the State Council transmitted the "Report on the National Working Symposium on Apiculture", jointly compiled by the aforesaid two ministries, to the people's committees in all provinces, autonomous regions and municipalities around the country. It also stressed, in an attached document, that "expansion of apicultural production can increase the state wealth and the income of rural cooperatives; and more important, it can boost crop output because the bee will help pollination". It called on all localities, and particularly those in the mountainous areas, in light of local conditions, to make active efforts to develop apicultural production. The report pointed out that the development of apiculture should depend mainly on rural co-operatives as well as state farms. They should raise both imported and indigenous bees. It also said that rural co-operatives should allow their members to raise honeybees as long as they could fulfil their labour quotas. According to the report, the state would grant a 15 yuan loan to each colony raised by beekeepers living in mountainous areas. The state would also adopt some preferential policies such as tax reduction to encourage apicultural production. It suggested that the trade departments should reduce exports of beeswax in order to meet the domestic need for bee breeding. It also urged the Chinese Academy of Agricultural Science to join hands with Fujian Agricultural College, Shandong Agricultural College (today's Shandong Agricultural University), the Agricultural Science Research Institute in Jiangxi Province, and other relevant institutions to create conditions for the establishment of a specialized apicultural science research institute. The State Council document and the report played a significant role in promoting the development of China's apiculture.

In the 1950s, the state and some local governments had set up a number of apicultural schools and courses. They had also begun to introduce specialized research organizations. Shandong Agricultural College, Subei Agricultural College (today's Jiangsu Agricultural University) were the pioneers in including apiculture in their courses. Hunan Province set up the Baihua Apicultural School in Wugang County; and the Guangxi Agricultural School introduced the apiculture major in 1958. The Guangdong Insects Research Institute set up a Bee Research Office in 1957. By the end of 1958, the Chinese Academy of Agricultural Science established the Apicultural Research Institute, the top Institute of its kind in China.

In 1959, the Ministry of Agriculture held a symposium in Guangdong Province on new methods of raising Apis cerana . More than 50 beekeepers from 10 provinces and counties where Apis cerana was the dominant domestic bee attended the symposium. The meeting paved the way for spreading the Apis cerana raising technology in the 1960s. Also in 1959, the Apicultural Research Institute under the Chinese Academy of Agricultural Sciences, in co-operation with some hospitals in various parts of the country, had set up an apicultural research co-ordination group to study the production of royal jelly, venom and propolis and to develop new bee products.

In November 1959, the institute sponsored a national apicultural research co-ordination meeting in Hangzhou, Zhejiang Province. More than 100 people from research institutes, colleges, hospitals and apiaries attended the meeting and 65 papers were discussed. At the meeting, the national apicultural research coordination group briefed the participants on its work on bee pollination, investigation of bee resources, renovation of beekeeping equipment and disease prevention. Li Jun, deputy director of the CAAS Apicultural Research Institute, made a concluding report at the meeting, which also approved the "Outlines of the1960 Apicultural Research Plan (Draft)" and the "Outlines of a Three - Five - Year Plan on Apicultural Research Plans." This meeting was a landmark in the development of China's apicultural science and technology.

2. Apiculture in 1960s and 1970s

In the 1960s and 1970s, natural disasters and some social factors brought setbacks to China's booming apiculture. The number of domestic colonies and the output of bee products had fluctuated. However, apicultural research, education, academic exchange and the development and utilization of bee products had witnessed a marked progress. The latter had created favourable conditions for the rapid growth of apicultural production in China.

(a) State leader Zhu De paid great attention to apiculture.

In early 1960s, Zhu De, chairman of the standing Committee of the National People's Congress, wrote a letter to the Central Committee of the Chinese Communist Party and Chairman Mao Zedong after he had inspected the CAAS Apicultural Research Institute. The letter reads like this:

The Central Committee and Chairman:

While staying in Beijing, I recently visited the CAAS Apicultural Research Institute and listened to the report made by its director. My impression was that it is necessary for China to go all out to develop the beekeeping industry. The direct benefits of apiculture are higher than that of agriculture in general terms. What's more important is that it can play a significant role in boosting the agricultural output. Bees are the "match-makers" for crop pollination. And experiments show that with help from bees, the output of various kinds of crops can rise from 23% to 100%. However, at the moment, China doesn't have enough domestic bee colonies. So, expanding apicultural production could be deemed as an additional way to increase agricultural output besides the "Eight-Character Charter for Agriculture". Also, bees are man's friend for health. Honey is a superb kind of natural food. It has already been proved that it can help treat a number of diseases (such as gastric and intestinal ailments, high blood pressure, arteriosclerosis, heart diseases, kidney disease, neurasthenia, tuberculosis and respiratory system diseases). Another new product called royal jelly (created by worker bees to feed queen bees - and we have now discovered the way of mass production by using artificial queencells) can help the

weak to gain strength and help cure diabetes and tumors. Bee venom has notable curative effects on rheumatism while propolis can help cure corns, calloses and warts. It is said that the Soviet Union and many other countries in Europe and North America are now studying the medical effects of bee products. We have also made some substantial progress in this regard. I believe it is necessary to promote the development of apiculture in China. Would you consider distributing opinions in writing together with the attachments to comrades attending this meeting?"

At that time, China was facing extreme economic difficulties. The fact that a state leader attached such great importance to and supported the development of apiculture made beekeepers in this country feel very proud of themselves and their work. It also encouraged the relevant departments to do a better job of supporting apicultural development.

(b) To upgrade production measures in order to increase the output and improve the quality of bee products.

In 1963, to improve the management of domestic bee migration, the Department of Domestic Bee Migration, the Ministry of Agriculture, issued the "Circular on Domestic Bee Migration". In December that year, the ministry held a national working conference on apiculture in Conghua County, Guangdong Province. The participants held discussions on wide-ranging topics such as strengthening the leadership, making full use of bee resources and encouraging planned domestic bee migration. They also studied the questions related to the improvement of the breeding of Apis cerana, disease prevention, and supply of beekeeping equipment. After the meeting, a wave boosting beekeeping production and research swept across the country.

In August 1973, the Ministry of Agriculture and Forestry (now it has been divided into two ministries) held a beekeeping experience-exchange conference in Beijing. It called on state, collective and rural household beekeepers to expand production. The meeting summarized the successful experiences of 11 apiaries from Beijing, Heilong, Jiang and other parts of the country. In the same year, the ministry sent a group of more than a dozen technical workers and model beekeepers to the Ningxia Hui Autonomous Region to promote apiculture there and to organize training courses. Thanks to such efforts and the support of local governments the number of domestic bee colonies in the autonomous region jumped from 330 in 1973 to 19,000 in 1978, representing an increase of 560%.

From 1977 to 1979, the Ministry of Agriculture pumped funds into and allocated timber to the poor areas in Shaanxi and Gansu Provinces to develop apiculture there. In addition, it organized training courses and set up apiaries and experimental stations. Most of such measures later paid off.

(c) To raise the overall level of apicultural science and technology.

In early 1960s, research institutes and colleges such as the CAAS Apicultural Research Institute and the Zhongshan University first controlled artificial insemination technology. Through a planned training programme, this technology was widely applied in apiaries around the country in late 1970s.

In the 1970s, China succeeded in developing a new method of breeding fine hybrid varieties. This new method, known for its low cost and convenience, brought in hefty benefits when it was applied in Sichuan, Heilongjiang, Jilin, Hubei, Jiangsu and other provinces, Thanks to this invention, Chongqing County in Sichuan Province replaced all its domestic colonies with fine hybrid honeybees during the period 1971-1973. As a result, the county's honey output doubled.

In 1973 and 1974, China imported more than 1 000 queen bees of foreign origin such as the Italian Bee (A. m. ligustica), the Carniolan Bee (A. m carnica), the Cyprian Bee (A. m. cypria) and the American/Italian Bee. They were used for breeding fine hybrids. With support from the state and local governments, by 1975 China had set up seven stock apiaries and more than 50 breeding yards in areas such as Wuxian County in Jiangsu Province and Kuandian County in Liaoning Province. Under the sponsorship of the CAAS Apicultural Research Institute, a national symposium on honeybee breeding was held. It called on beekeepers in China to study bee resources, to preserve and breed stock bees, to learn how to prevent disease in Apis cerana hives, to spread hybrid bees, and to set up a nationwide bee breeding co-operation network. The Ministry of Agricultural earmarked a certain fund each year to support the activities of the network.

During the 1960s and 1970s, Chinese farmers were very active in using bees to help crop pollination. Even in the early 1950s, a fruit farm in Liaoning province reported marked economic returns by relying on bees to pollinate its apple flowers. In 1976, the same farm invited the keepers of more than 10 000 colonies from other parts of the country to help pollination of about 1 million apple trees. That year, the farm's apple output was more than 10 000 tons higher than those of the previous two years. Using the same method, Shandong, Heilongjiang, Sichuan, Yunnan, Zhjiang, Jiangxi and other provinces reported an increase of 23-70% in their production of apple, orange, rape seed, sunflower, cotton, buckwheat and crow vetch seed. So, the People's Daily carried a report, entitled "Expansion of Apicultural Production Boosts Grain Output", to praise the significant role played by apiculture in promoting agricultural production.

From the early 1960s to mid-1970s, Chinese researchers and beekeepers made great progress in controlling bee mites and sacbrood disease, which used to plague the country's beekeeping industry.

During the two decades of 1960s and 1970s, China developed a number of advanced beekeeping equipment and machines. They included digitally-controlled foundation machine tools, electrical bee venom collectors, pollen traps, plastic cells, grafting tools, special bee transportation trucks, and coated honey tubs. The relevant state departments supported such technological progress. For instance, in 1978, the State Planning and Economic Commission allocated special funds to import large amounts of iron sheet and entrusted the Ministry of Foreign Economic Relations and Trade with the importation of honey tubs in order to prevent pollution from heavy metals.

Starting from early 1960s, Apis cerana keepers made great efforts to develop new bee products. Since the mid-1960s, some provinces, autonomous regions and municipalities had begun the mass production of royal jelly. In the late 1970s, the technology had spread to almost all parts of the country and royal jelly and its products became a staple bee product. Later on, China also began to produce bee pollen, propolis and venom.

(d) To improve apicultural education and set up apicultural societies.

Production development depends on scientific and technological progress, but the latter is closely related to the training of scientists and technical workers. Chinese governments at all levels paid due attention to improving apicultural education. In 1960, entrusted by the Ministry of Agriculture, the Fujian Agricultural College, the Southwest Agricultural College in Sichuan Province, the Yichun Agricultural College in Jiangxi Province and a few other colleges had started a two-year apicultural training programme. They trained a large contingent of high-level apicultural technologists and managerial personnel.

In June 1979, the Chinese Apicultural Associtaion was launched in Beijing. Since then, various provinces, autonomous regions and municipalities have created a number of apicultural societies, beekeepers' associations and apicultural-study bodies.

(e) Adjusting the apicultural production system.

In 1972, China had 4 million colonies of domestic bees (no statistics available for the 1966-1971 period) and turned out 50 200 tons of honey. These figures were 36% and 500% up from the 3 million colonies and the less than 10 000 tons of honey of the early 1960s, respectively. In 1978, although the number

of colonies slid to 3.897 million, the country's honey output catapulted to 97 100 tons. In 1979, the number of colonies reached 5 298 million and the honey output grew to 109 900 tons, 36% and 13.2% higher than the figures of 1978, respectively. The 1979 figures were 60.4% higher than and 16.4 times that of 1961.Since 1960, China's honey export grew each year. In 1965, China exported 12 900 tons of honey. The 1979 figure was 22.7 times that of 1961 and it surpassed the output of Mexico and Argentina for the first time. China became the number one honey exporter in the world. From 1960 to 1979, the average annual growth rate in China's honey export reached 35.11%. In 1979, China turned out 150 tons of royal jelly and exported 50 tons. Both figures were the highest in the world that year.

3. Apiculture Since the 1980s

After the Third Plenum of the 11th Party Congress held in 1978,China has adopted the policy of reform and opening the door to the outside world. This new policy has given great impetus to the development of the country's beekeeping industry. The 1980s witnessed the rapid expansion of China's apiculture.

(a) To improve the macro-management of apiculture.

Since the beginning of the 1980s, governments at all levels and the relevant departments also adopted effective measures to improve the macro management of apiculture.

In January 1983, the Science and Technology Group under the Secretariat of the CPC Central Committee submitted a document to the Ministry of Agriculture, Animal Husbandry and Fishery. Entitled "Proposals on Developing Apiculture and Promoting Apicultural Modernization", the document was published in the Economic Daily. The document pointed out the potential and existing problems of China's apiculture and called for great efforts to be made to modernize it, to actively purchase technological research, to increase investment in education and to protect bee resources.

In September 1983, the Ministry of Agriculture. Animal Husbandry and Fishery (now the Ministry of Agriculture) convened a symposium in Yinchuan to discuss beekeeping in Northwest China. Addressing the question of poor marketing of bee products at that time Minister Lin Hujia told the meeting that the most urgent task for developing apiculture was to find the market for bee products. He said both the producers and the production administrative departments should pay attention to the processing and marketing of bee products. The minister predicted that if proper efforts were made, the problems of poor marketing could be resolved within three to five years.

In May 1986, in line with the instruction made by Party General Secretary Hu Yaobang on improving the honey quality, the Ministry of Agriculture, Animal Husbandry and Fishery, the Ministry of Commerce and Trade jointly held the National Apicultural Congress in Beijing. Liu Jiang, Pan Yao and Wang Pinqing, vice ministers of the ministries who were in charge of work related to apicultural production, attended the meeting. In view of the exiting problems, the basic tasks of apicultural production were "to continue reforms, strengthen management, improve technology, upgrade quality, expand sales in the domestic market, actively boost export and develop the beekeeping industry in a planned way". The conference also decided that the departments of agriculture, commerce and trade should enter close co-operation in order to fulfill seven basic tasks. They were to improve the administration and guidance of apicultural production, to markedly upgrade the quality of bee products, to earnestly carry out the policy of pricing the products according to their quality, to further spur bee product processing and marketing, to set up quality bee export products production on a trial basis, to advance scientific research, education and new technology dissemination, and to strengthen the leadership of apicultural production.

In order to carry out the decisions of the conference , the Ministry of Agriculture, Animal Husbandry and Fishery issued the "Provisional Rules on Management of Apiculture" in October that year. The 24-article document clearly defined the administrative jurisdiction of the ministry and the legitimate rights and interests of the beekeepers.

Following the three-ministry conference, 20 provinces, autonomous regions and municipalities convened working meetings on apiculture. The agricultural departments, with support from local government, had set up 207 apicultural administration stations, with nine at the provincial level and 198 at the county level. Since 1986, Hubei Province had also set up one apicultural administration station at the provincial level and 40 at the county level. Most localities around the country had later appointed cadres to be specially in charge of apicultural development. They also improved the administration of, and services for, apicultural production. Some included apiculture in government work plans as an integral part of the breeding industry. For instance, apiculture had already become the number two industry in Cixi, Zhejiang Province, second only to cotton production. Every year, the city convenes two conferences to facilitate the beekeeping experience and technology exchange. The city also introduced a beekeeping industry company, a bee products processing factory, an apicultural research institute and a few breeding apiaries to improve the services for the apicultural production.

Since the 1980s, the State Planning Commission, the State Council Aid-to-Poor Area Office and relevant state departments such as agriculture, commerce, trade public health and light industry, have all allocated funds or granted loans to apicultural projects to help improve education and technology dissemination related to the beekeeping industry. In addition, China has set up bee product quality-control centres at the state and ministerial levels, apiculture companies, bee product processing factories and production bases. All such measures have contributed to the fast development of China's apiculture.

(b) Formation of a complete system of production, supply and marketing.

To sell bee products, it is necessary to combine their production, supply and marketing into an integral system. This conclusion is based on many years' experiences accumulated by Apis cerana keepers. Since 1978, China's policy of reform and opening to the outside world has provided favourable conditions to form such an integral system.

(i) To reform the bee products management system and expand operational channels.

In 1983, the state replaced the traditional state monopoly for the purchase and marketing of honey with the negotiated buying and selling mechanism. This move immediately resolved the "hard-to-sell" problem. In 1990, the State Council issued a document on improving the foreign trade system and in the following year, the state stopped "policy subsidies" for exporting honey. These measures have further sharpened China's competitive edge in the honey market and facilitated the formation of the production-supply-marketing system.

(ii)To speed up the development of bee products generation bases.

Since the 1986's national working conference of apiculture, the state has invested millions into building a honey-export system, quality bee products bases and commodity bee products bases. By 1990, 40 such bases had been set up in 26 counties (cities) in eight provinces. The agricultural departments had set the criteria for selecting and accepting such bases in order to help them form a production-supply-marketing mechanism. The Ministry of Agriculture called a number of national conferences during the 1987-89 to promote the integration of production and marketing. The experiences accumulated by beekeepers in areas such as Hulin County in Heilongjiang Province, Pingjing County in Hunan Province, and Putian County in Fujian Province had later been spread to other parts of the country.

(iii) To provide socialized services.

To follow the spirit of the 1986 national working conference of apiculture and to carry out the "Provisional Rules of Apicultural Administration" issued by the Ministry of

Agriculture, Animal Husbandry and Fishery. The apicultures administrative stations at various levels, besides playing their administrative functions, have concentrated more on providing services for apicultural production and facilitating the integration of apicultural production and bee products processing and marketing. Many administrative stations have set up their own firms for purchasing, marketing and processing of bee products.

Since the 1980s, many localities throughout China have set up state-collective and individually-run commercial apiculture departments. Large companies such as the Beijing Apiculture Company and the Yangtze Company in Hubei Province all have their own bee products processing factories and their business turnover each year exceeds I million yuan. The Yangtze Apiculture Company supports mainly the apicultural production and the integration of production, supply and marketing. By 1991, the firm purchased, processed and exported about 80% of the royal jelly output of Hubei Province. To meet the market demands, specialized rural beekeeping households have also formed their own joint ventures. Usually, an apicultural co-operative consists of 400 to 500 such households,which sends out salesmen to various parts of the country for the formation of a complete system of production, supply and marketing in the beekeeping industry. Since 1986, for instance, the Beijing Bee Products Association has formed a loosely-knit service body to coordinate the apicultural production, the comprehensive utilization and development of bee products, and the efforts in creating an integral mechanism of production, supply and marketing of bee production grew rapidly. In 1990, the city had 70,000 colonies of domestic bees, 32% higher than that in 1985; its honey yield reached 2 640 tons - 23.8% higher; the beekeepers' income totalled 10.60 million yuan, up 35.9%; the output value of bee products processing stood at 300 million yuan, representing an increase of 127%; the export earnings from bee products exceeded 10 million US dollars doubling the figure of 1985; and the tax and profits from the industry jumped by 64.35% to reach 30.34 million yuan. During the five year period between 1985-1990, the accumulated output value of the bee products processed in Beijing totalled 1.12 billion yuan and the combined export earnings amounted to 37.80 million US dollars.

The creation of an integral production-supply-marketing mechanism helps guarantee the high quality of bee products, lowers the production cost, expands the market and arouses the initiative of beekeepers.

Thanks to China's reform and opening-up policy, some firms processing bee products in coastal areas have gained an autonomy in foreign trade. This adds a new competitive edge to China's bee products in the world market. Since 1985, following the principle of "equality and mutual benefit", the Apis cerana keeping industry has invited a number of foreign firms to run joint ventures in China. This has not only forged closer friendship and co-operation between Chinese and overseas apicultural circles, but also helped promote the prosperity of the world apicultural economy.

(c) To bring apicultural science and technology development into a higher stage.

Since the 1980s, the concerted efforts made by Chinese researchers and beekeepers have yielded rich results:

(i) Rapid expansion of a contingent of technical personnel.

Since 1984, the Apicultural Department of the Fujian Agricultural College has generated more than 200 graduates who finished regular college courses; the Shaanxi Agricultural School , the Heilongjiang Mudanjaing Agricultural School have also trained more than 300 graduates. In order to improve the apicultural management and technological levels, the Ministry of Agriculture and key bee-raising localities have organized a number of technical training courses in light of local needs. The ministry has also worked out technical examination criteria and methods for beekeepers and workers who process bee products. Meanwhile, the Ministry of Commerce, each year, organizes technical training courses for purchasers of bee products.

Today, there are about 1000 apicultural and technical workers who hold the intermediate and senior professional titles many of them being members of the Chinese Apicultural Society. They have become the technical backbone force in China's beekeeping industry.

(ii) New achievements in developing bee products and applying apitherapy.

Along with the progress in developing and utilizing bee products, a number of processing enterprises have come into being .In 1979, there were only scores of such enterprises in China, but the figure rocketed to nearly 1 000 by the end of the 1980s. Now, the output value of these enterprises totals 4 billion yuan each year. The figure in Jiangsu Province alone stands at 300 million. In the 1980s, new technology was applied to the development of new bee products. Tonics made from bee products, medical herbs and other nutritional materials were produced. Besides royal jelly, pollen, propolis and venom were all used to develop a number of medical, tonic, cosmetic and food products. The packaging of such products was very colourful and close to the advanced standards found throughout the world.At the same time, a number of hospitals and clinics using apitherapy were set up. In 1985, the apitherapy research office in Lianyungang, Jiangsu Province, was expanded into an apitherapy hospital. These hospitals and clinics were pioneers in the world in applying apitherapy and particularly the use of bee stings. .

(d) To standardise the quality control of bee products.

As the number of varieties of bee products keeps growing and the market keeps expanding, more efforts have been made to improve their quality control. In the early 1980s the Ministry of Commerce promulgated their standards of quality for honey and wax, and later for royal jelly and pollen. The Ministry of Foreign Economic Relations and Trade drew up criteria for the internal control of the quality of honey for export and for royal jelly too. In addition, some localities have set up quality control and hygienic standards for the purchasing and exporting of larvae, drone pupae and propolis. Following these standards, the Apis cerana keepers and processors of bee products will be able improve the quality of their own produce.

In the 1980s, the commercial, trade, light industry and agricultural departments all increased their personnel specialized in the quality control of bee products. In Beijing and Hubei Province, the Ministry of Commerce and the Ministry of Agriculture have each set up a bee products quality testing center at ministerial level. Besides checking the quality of bee products, these centres also engage in technology, research projects and organize technical personnel training programmes.

(e) To continuously develop new apicultural technology.

The Apis cerana keepers have accumulated rich experiences and experimental results through long -time practice. Yang Duofu ,a beekeeper in Hulin County, Heilongjiang Province, invented the "number-controlling beekeeping method" making him the first one in China to apply mathematics to apiculture. Wang Jin and Zhou Liangguan from Pinghu County, Zhejiang Province, spent more than 10 years on breeding a new species of Italian bee. Each colony of the new species generated an average of 3 kg of royal jelly in 1989. Since then, the new species, called "Pinghu Royal Jelly Bee" has been introduced to other parts of the country. By introducing species known for high royal jelly yield and through the use of plastic cells, some beekeeping households in Zhejiang and Jiangsu Provinces which raise more than 50 colonies have each reaped a net income of more than 10,000 yuan (1200$) a year. This figure equals the total yearly income of households raising 250 pigs.

Starting from 1984, the Ministry of Agriculture, Animal Husbandry and Fishery, each year allocated a special fund to support the dissemination of moveable-frame hive technology for raising Apis cerana in more than 10 counties. This investment later paid

off. The number of colonies of Apis cerana raised with this technology jumped from 500 000 by the end of the 1970s to more than 1 million 10 years later. Meanwhile, the average annual honey output of each colony grew from 5-6 kg to more than 30 kg. The economic returns totalled about 30 million yuan.

(f) To further build up the breeding and disease prevention systems.

The two systems of bee breeding and bee disease prevention had taken their initial shape by the 1970s. In order to continue to improve the two systems, the Ministry of Agriculture listed this as a key apicultural project in the "Sixth Five-Year Plan" and the "Seventh Five-Year Plan" periods. Since the 1980s, researchers from the CAAS Bee Research Institute have developed two kinds of fine hybrid bees. Experiments in Hunan province showed that the honey output of the new strains could be 50% higher than that of others and that the former were better than local species in resisting degeneration. Also, the Jilin Province Apicultural Research Institute developed the "Black Carpathian" bee, which has been spread to more than 10 other provinces and autonomous regions around the country. The next year, 50 colonies of the "Black Carpathian" bees were exported to South Korea. In 1989, the Ministry of Agriculture designated the Breeding Apiary of the Jilin Province Apicultural Research Institute and the Liaoning Province Breeding Apiary as key queen bee breeders and suppliers.

In co-operation with local institutes, the CAAS Bee Research Institute formed a bee disease prevention system in China. It made notable progress in adopting effective measures for control of sac brood diseases, bee mites and paralysis disease.

(g) To promote international exchanges.

Since the 1980s, the Chinese apiculturists have increased contacts with overseas counterparts. More than 200 people from apicultural circles in Europe, America, Oceana and Asia have visited China for technical exchange and as part of an economic co-operation program. Chinese apiculturists have also attended a number of world conferences and symposiums related to apiculture.

In 1985, the Chinese Apicultural Society officially joined APIMONDIA. Since then, China has sent delegations to attend the 30th, 31st, 32nd and subsequent International Apicultural Congresses and the International Beekeeping Fairs.

(h) To ensure steady growth in apicultural production and products for export.

Following the big stride made by China's apiculture in the 1970s, the industry has witnessed a marked expansion since the 1980s. In 1991, China boasted 7 541 million colonies of domestic bees (excluding those in Taiwan Province), 42.3% more than in 1979 and accounting for 13% of the world"s total. In that year, China's honey output reached 208 000 tons (excluding the figures for Qinghai,Tibet, Hainan and Taiwan), 89.3% higher than that in 1979 and making up 20% of the world"s total. Also, the country's output of royal jelly, pollen and beeswax totalled 1 000 tons, 800 tons and 3 000 tons, respectively. This made China the number one producer of these bee products. Its production of drone pupae, bee venom, proplis and larvae could meet the needs in both domestic and international markets and the annual output value of apiculture exceeded 1 million yuan. Sichuan and Zhejiang Provinces, the top beekeeping regions in China, each have more than I million colonies of domestic bees. Cixi and Jiangshan in Zhejiang Province each raise more than 200,000 colonies. The apicultural technological level there is the highest in the country. An average colony there can yield about 100 kg of honey with the highest reaching 200 kg and the figure for royal jelly ranges between 2.5 kg and 4 kg..

Each year, China's exports of honey account for 25% of the world's trade volume. The honey is exported to more than 40 countries and regions including Japan, the United States and Germany. It also exports 300-400 tons of fresh royal jelly each year, making up more than 90% of the world's trade volume. The royal jelly is exported mainly to Japan, the United States and some European countries.

(i) A bright prospect for China's apiculture

The development of China's apiculture has gone through several thousand years of primitive beekeeping, a stage involving the introduction of new beekeeping technology and a stage of rapid advancement. This indicates that China's apiculture has an important value both in high economic returns and its wide social benefits.

First of all, China's reform and opening-up policy has provided the preconditions for promoting economic growth and technological progress in apiculture. In addition, the 1.1 billion Chinese people have formed a huge market for bee products. Along with the improvement in their living standards, the Chinese population will consume about 550,000 tons of honey if each person eats an average of 0.5 kg annually. The figure is 10 times the current consumption. If an average colony yields 26 kg of honey a year, China needs to raise 21.15 million colonies to meet the domestic demand. By taking into consideration the amount of honey needed for export and processing of medicines, the number of domestic colonies should be raised to 25 million or 3.3 times the figure of 1991. China has enough resources to raise 25 million colonies of domestic bees provided that the nation continues to plant trees and to protect its resources more carefully. Given all the above-mentioned favourable conditions, more people will engage in apicultural research and production and the top beekeeping provinces such as Zhejiang, Sichuan and Jiangsu will continue to spread the advanced technology to Northwest and Northeast China and to mountainous areas. At the same time, China will continue to modernize its apicultural industry and it is predicted that China's apiculture will have made greater and faster progress in the last decade of the 20th century.

Li Jianke (born in 1962) achieved his master's degree at the Chinese Agricultural University in 1996 and then did his Ph D at Zhejiang University. He is now a professor and teaches at the Zhengzhou College of Animal Industry. Although he is a young apiarist, he is on the board of directors of the Chinese Apicultural Academy and he has been awarded twice for his scientific research and achievements in beekeeping. He has travelled widely in Europe, Asia and Africa to lecture and for academic exchanges and 13 of his papers have been published in leading beekeeping journals in many parts of the world. His work with honeybee selection has started a new and important epoch in the development of royal jelly production. Over the last five years he has been involved with the publication of five new books some of which have become required college texts by the Chinese Ministry of Education. Li Jianke is currently engaged in molecular characterisation studies on heredity in honeybees.

Use of food grade mineral oil and integrated beekeeping practices in the control of varroa infections in *Apis mellifera* colonies

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Summary

The purpose of this research was to study the acaricide effect of food grade mineral oil, 0.86 density, in the form of emulsion and 15 microns vapor. The research was performed in an apiary of the beekeeping school of the municipal government of Azuqueca de Henares, (Guadalajara, Spain). The test was performed with 10 colonies hived in Langstroth type hives equipped with 4mm hardware cloth bottom screens. Test results demonstrate that food grade mineral oil is an efficient, economic and non-contaminating acaricide, especially when integrated with other control methods. High resolution liquid chromatography laboratory analysis (HCPL) showed that food grade mineral oil does not alter the quality of the honey. DNA tests of mites collected during the study identified Varroa destructor as the primary parasitic mite in the apiary. Similarly, DNA tests of the honey bees determined that three of the colonies belonged to African lineage while the rest belonged to Western European lineage.

Key Words: Varroa destructor, Apis mellifera, food grade mineral oil (FGMO)

Introduction

Varroa infection of honey bees (Apis mellifera) represents a world-wide menace to beekeeping (Ellis, 2000) having destroyed the majority of feral colonies and a high percentage of domestic colonies (de Jong, 1977; Sammataro, 1997). The pathogenicty of this plague is very serious, as untreated colonies die within one or two years (Rodriguez, 1997; Anderson, 2000; Ellis, 2001). Infected colonies die due to pathology caused by the mites, robbing and secondary illnesses. It has been suggested that honey bees are susceptible to bacterial and viral diseases when their tegument is damaged by mites and specifically, that Varroa jacobsoni contributes to the introduction of these diseases acting as a vector for mycotic diseases, (Brodsgaard et al, 2000) and their harmful effects diminish the performance of adult honey bees (Salvachua et al, 1999).

Scientists around the world have put a great deal of effort attempting to find efficient acaricides which are harmless to honey bees and which will not contaminate honey with toxic residues. Their studies have shown that the number of substances that can be utilized against the mites is small due to many reasons:

- resistance to acaricide products (Barbero et al., 1997; Baxter et al, 1998; Braunstein, 1998a; Elzen et al, 2000; Ellis, 2000; Faucon et al, 1995; Lodesani et al, 1995; Milani, 1995, 2001; Spreafico et al, 2001).
- high cost of treatment (Callejo and Iniesta, 2000; De Las Rosas, 2001).
- toxic residues that contaminate the honey (Anderson, 1994).
- treatments are limited to certain seasons of the year according to manufacturers recommendations for the acaricides.

Due to difficulties inherent in chemical pesticides, it is evident that there is great need to find integrated alternate methods (Ellis, 2001; Spreafico et al, 2001; Kamran, 2000) to treat these mites. Hence a great number of alternate methods have evolved with a varied degree of acceptance due to their complexity, toxicity, ambient temperature dependency, high cost and low degree of effectiveness.

The following are some of the most commonly found:

- genetic selection according to hygienic behavior of the colonies (Buchler, 1994).
- mite collection in drone cells.
- metal screen bottom boards (Pettis and Shimanuki, 1999; Ellis J. D.; 2001).
- aromatic oils (Imdorf et al, 1999).
- food grade mineral oil (Aguirre, 1999; Rodriguez, 1997a,b, 2000, 2001; Pajuelo, 2001; De las Nieves, 2001; Zola, 2000).

This study is the result of a continued effort to search for more economic and easier methods of application of food grade mineral oil combined with integrated beekeeping practices that have demonstrated to be effective in the control of varroa mites. Among these practices are the utilization of screened bottom boards, selection for hygenic behavior and DNA analysis of the mites, a very important factor since there exists genetically different varroa mite populations with distinct differences in their virulence (Anderson and Fuchs, 1998; De Guzman et al, 1999).

Food grade mineral oil, 0.86 grams/l is a petroleum derivative that is odorless, colorless, and does not contaminate and is especially utilized for operations requiring a mineral oil exempt from toxicity. It is widely used by industrial nations in the food industry and medicine as a vehicle and as a lubricant. Utilization of food grade mineral oil as an acaricide is considered highly beneficial. Because of its efficacy, it can be utilized at times when there are large numbers of mites and synthetic acaricides cannot be used.

The acaricide mechanism of food grade mineral oil is based on various factors:

a) Morphologic and biologic characteristics of the mites.

• The body of the Varroa mite is flat offering a large surface/volume relationship that makes it vulnerable to treatment with oils (factor also utilized by Italian investigators (Bee-L archives; Rodriguez, 2001).

• Varroa mites as well as the honeybees breath through spiracles through which gaseous exchange occur by means of adjustments of their respiratory system (Pugh et al, 1992). Mineral oil blocks the spiracles of the mites causing their death by asphyxia. While honey bees also breathe the oil, the size of their spiracles is much larger than that of the mites, thus it is possible to utilize mineral oil as an acaricide without harming the honey bees. Also the body of the mites is covered by pores which the mites utilize to take in moisture for their hydration. These pores are also blocked by mineral oil thus interfering with another biological process of the mites.

• Varroa mites cling to the body of the bees while being carried about. During the application of mineral oil, in vapor or emulsion form, a fine film of oil is deposited on the bodies of the bees which interferes with the ability of the mites to cling to the bees (Lujan, 2000; Kamran, 2001), causing the mites to fall off.

• Sanitary behavior of the honey bees: honey bees begin to remove the emulsion coated cords promptly and in the process their legs become coated with mineral oil that is later transferred to their bodies when they comb themselves.

b) Utilization of screened bottom boards.

Screened bottom boards prevent mites that have fallen off from re-attaching themselves to the bees due to the effect of the mineral oil.

Materials and methods

1. Establishment of the experiment

The research project took place from 13 March to 16 July 2001 at the Azuqueca de Henares school apiary, sponsored by the municipal government. The apiary is located adjacent to the Villanueva de la Torre road, among an olive tree farm with scant flowering vegetation. The hives were of the Langstroth type and had not been treated since the past autumn at which time they were treated with food grade mineral oil.

Since it is well known that untreated colonies die during the test period or soon thereafter, all colonies were treated during this test because they were on a loan basis and with zero financing.

2. Treatment with food grade mineral oil

The treatment consisted of applying food grade mineral oil vaporized (15 micron size particles) with a Burgess Propane Bug Killer and cotton cords coated with emulsified food grade mineral oil mixed with bees wax and honey.

2.1. Preparation of the emulsion

The emulsion was prepared according to the formula developed by Dr. Pedro Pablo Rodriguez (developer of the use of food grade mineral oil). Water had been omitted (as described in the original formula) to prevent fermentation of the honey. The ingredients for the emulsion are as follows: 500 mls food grade mineral oil, 225 grams beeswax, 300 grams honey, sixty 500 mm long by 8mm diameter cotton cords. The procedure for making the emulsion is as follows: heat the food grade mineral oil in a metal container, add the beeswax and stir to dissolve the wax and prevent it from burning. Remove the container from the heat source and add the honey and cords. Stir with a wooden spoon to allow the cords to soak up the emulsion. Allow the emulsion to cool.

2.2. Treatment with the emulsion and vaporizer

Two pieces of the emulsion soaked cords were placed on the top of the frames, and a stream of vapor (for about two seconds per hive) was blown through the hive entrance every 15 days during the duration of the experiment.

2.3. Application of fine paste boards coated with solid Vaseline on bottom boards

Utilization of hardware cloth screens allowed mites to fall through for subsequent counting every 7 days without interfering with normal hive activities.

3. Chemical analysis of the honey.

Samples were collected at the end of the experiment and sent for analysis. Tests revealed that the use of food grade mineral oil does not alter the quality of honey.

4. DNA characterization of mites and honeybees

Honeybee and mite samples were collected from the 10 test hives, preserved in ethane alcohol and sent to the University of Murcia laboratory for testing.

Molecular characterization was based on DNA mitochondrial sequence, according to which are classified the four evolutionary lineages of honeybees present in Spain, African A in the southern peninsula and Western European M in the north. Similarly, the presence or absence of mitochondrial sequences are utilized to determine the species and type of Varroa (destructor or jacobsoni) present in the colonies.

5. Mean temperature.

Temperature data was recorded by the Azuqueca meteorology station located one kilometer away from the apiary. See Graph No. 1.

Results and discussion

1. Development and condition of the hives

Special emphasis was made on the following aspects of the hives: number of frames with brood, number of frames with bees, honey stores and other observations made on March 13, April 23, and June 25.

Honey yield by individual hive is reflected in Table 1 below. Hive No. 7 did not yield honey because it was utilized for bee package production (4) of which each had a full super by 11 September 2001.

2. Degree of infection of the hives. Evaluation of the treatment with food grade mineral oil.

Mite counts were performed weekly to evaluate the efficacy of food grade mineral oil as an acaricide. (see bar graphs)

Evaluation of the degree of infection was obtained by means of counting the number of mites in 100 sealed brood cells (50 female cells and 50 drone cells). Mite counts were made at the start, middle and at the end of the study.

The following formula was utilized to estimate efficiency of the treatment. (see graphs below.)

TABLE 1: Honey yield per hive

Hive No	Net Yield kg 16/7/01	Net Yield kg 11/9/01	Net Yield kg 6/11/01	Total
2	13	0	5	18
5	27	16	21	64
6	28	0	14	42
7	0	0	10	10
11	0	10	0	10
15	0	15	0	15
19	27	32	5	64
20	18	30	0	48
26	0	15	12	27
29	0	25	0	25
Total kg	**113**	**143**	**67**	**323**

TABLE 2. Hive health and efficiency of the treatment

Hive No	13/3/01	20/5/01	16/7/01	Efficiency %H
2	11'5	44	5	56'52
5	0'55	2	0	>99
6	0	0	0	>99
7	0	0´8	0	>99
11	1'05	0	0	>99
15	1	0	0	>99
19	2'14	0	0	>99
20	0	0	0	>99
26	No cria	0	0	>99
29	1	5	0	>99

TABLE 5. Distribution of varroa by species and haplotype in the studied colonies.

Hive No.	Lineage	Haplotype
2	destructor	Korean
5	destructor	Korean
6	destructor	Korean
7	destructor	Korean
11	destructor	Korean
15	destructor	Korean
19	destructor	Korean
20	jacobsoni	Java
26	destructor	Korean
29	destructor	Korean

TABLE 4. Lineage and haplotypes of the bees in the Azuqueca de Henares apiary.

Hive No.	Lineage	Haplotype
2	African	A2
5	African	A3
6	African	A2
7	European (M)	M4
11	European (M)	M4
15	European (M)	M4
19	European (M)	M4
20	European (M)	M4
26	European (M)	M4
29	European (M)	M4

100(i-f)/i

where i=initial % of varroa and f= final % of varroa

At the start of the study, hive No. 2 showed an infection level of 11 %, while the rest of the hives showed low levels of infection. After 68 days into the study, hive No. 2 showed an increase of infection (44%), hives No. 5, 7, 29 showed a slight increase, while in the rest of the hives, infection showed to be below 1%, and hive No. 2 showed a level of infection of 5%.

3. Honey Analysis

Honey showed the following analysis: Humidity 14.1 % H.M.F concentration 0.4 mg/Kg. Pollinic analysis showed origin of honey to be of a local leguninous plant (retama).

4. Molecular characterization

Honey Bees

Molecular analysis of samples of bees from the 10 colonies studied was performed according to previously described protocol (De la Rua et al., 2000). Analysis of samples from the Azuqueca de Henares colonies indicate that three of the colonies belong to the African lineage while the rest belong to the Western European lineage. See table 5 below.

Varroa

The molecular analysis of the mites in the Azuqueca de Henares apiary was performed according to the protocol by Anderson & Fuchs (1998). See Table 6 below. The analysis reveals that all hives were infected with the destructor species, predominant in Europe, except hive No. 20 that was infected by the jacobsoni species.

5. Mean Temperature

Study of temperature recordings seem to indicate a relationship between the ups and downs in the mean temperature in the area and that of varroa infection in the hives.

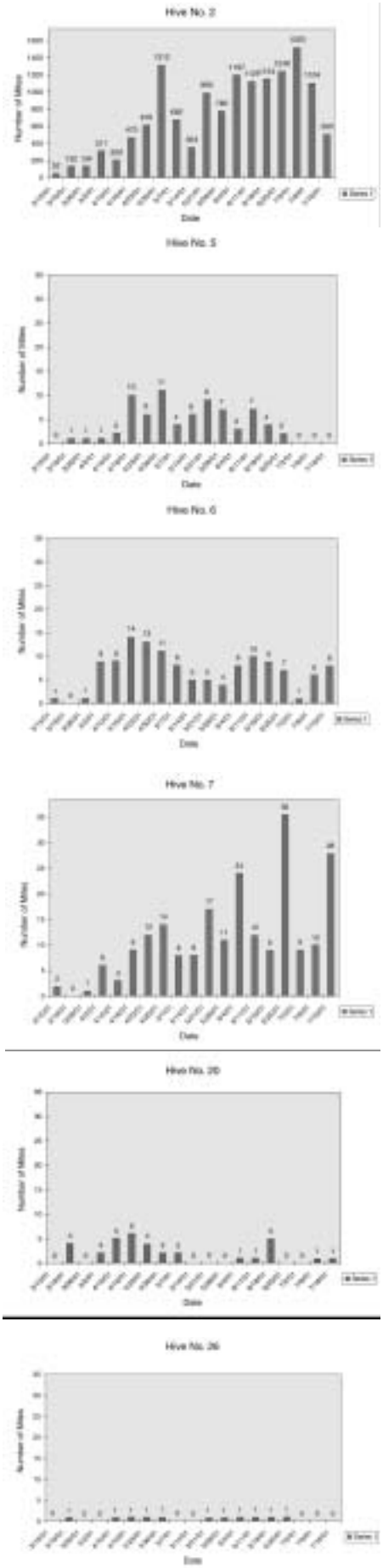
6. Discussion

The use of food grade mineral oil has shown to be highly efficient for the control of varroa infection and economic, non-contaminating and gentle to the environment.

Maximum efficiency of food grade mineral oil is obtained when used during the entire biologic cycle of the hive contrary to that of synthetic acaricides that can be utilized only during restricted periods of time. In addition, since food grade mineral oil can be utilized during the entire biologic cycle of the colony, it contributes to maintain low levels of varroa infection. It is strongly recommended as a prophylactic to prevent reinfestations. Honey yield of the colonies of this study can be considered as excellent considering the area to have scant flowering plants.

Next year's study with food grade mineral oil will include other forms of application without sacrificing its efficiency.

Bar graphs: individual hive mite count



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Advertising: let it work for you!

John Phipps and James Fischer

In all the years that I have been involved with beekeeping journals, I have never devoted so much space to a single product - with 98% of the material coming from the producers themselves - and with none of their claims being endorsed by anyone else. However, whilst the product itself caught my attention, one of my reasons in publishing James Fischer's 'promotional work' is to show how effective advertising can be if it is just that little bit different to anyone else's. Fischer's campaign is creative and humourous and a lot of thought has gone into its preparation. He grabs your attention, in the first place, and then gives an enormous amount of detail about the product and why he thinks it is has an important place in the apiary and compares "Bee-Quick" with the other methods available for clearing bees from supers. Throughout the whole of his web pages devoted to the product, he shows his wealth of knowledge, gained by experience, of the tricky problem of clearing bees and continues to entertain the reader right until the very end. Anyone involved in beekeeping as a business knows that advertising, apart from catching the 'targets' attention, must be sustained. Cut out your advertising and effectively, you are out of the market. However, the same old advertisement appearing, time after time, becomes very tired looking, so an attempt must be made to freshen up that valuable space that you have in a corner of a magazine. Thorne's, the UK beekeeping appliance manufacturers and dealers, are good at this. They change their adverts frequently and their ideas and witty wording are linked to the time of year the journal appears. Beekeepers haven't the budgets for large, costly campaigns - but a little brain-storming from time to time can produce excellent results.

Another reason for reproducing much of James' work in its entirety, is that within the text, there is a lot of information on clearing honeybees from supers - an important topic for every beekeeper. James does not claim that Bee-Quick will solve the problem for every beekeeper and there is a money back guarantee on the product. However, many beekeepers will have empathy with the writer on the drawbacks he describes for many of the current methods of clearing supers, albeit that he takes a one-sided view. I must add. too, that It is not my intention here to knock the products of manufacturers or dealers who have spent a lot of time developing or promoting other methods of clearing bees - what is represented here is just one person's viewpoint. If you disagree with his views, just drop us a line.

Clearing bees from supers is an experience that both myself and the publisher of this magazine would like to forget. We had to remove a couple of dozen hives from a field of oil seed rape one evening in May. A lot of the honey in the supers was not sealed over, but it was important that the bees were removed that night and taken from Lincolnshire back to Yorkshire, a couple of hours journey. The publisher wanted to remove the supers so that it was easier to carry the hives and to prevent the honey from sloshing all over the bees during the journey. It was a hot, very humid night. Well before dusk we tried the benzaldehyde. I think we read the instructions beforehand. Before long we had huge streams of bees flowing out from the front of the hives - and the chemical gave me a severe headache. Once the supers were removed we tried to coax the bees back into the hive with some smoke. That's when the thunderstorm started. The field was clay and turned into a mud bath, we were sliding all over the place. Our bee suits and gloves became soaked and permeable to every bee sting - and there were lots of them. It was a long night. Fortunately, I did not have the long drive home once the hives were on the trailer. I think the publisher left the bees on the trailer outside his backdoor when he got home so he could deal with them in the morning. I have never used benzaldehyde since. In fact, when I lived in the UK, I had my own way of clearing bees from the supers. It was natural, a bee never died, no traps to get propolised up and never a bee left in the supers. I just piled one honey box on the hive after another and left them there until the first frosts. I took away the boxes that I wanted and left one or two for the bees. As it was oil seed rape honey it would have needed to be melted down anyway. So why spoil summer tackling it when there are bees everywhere when it can be done safely in the warmth of a honeyhouse in winter whilst listening to some good music? Perhaps, I wouldn't be able to do that now with varroa being so rampant and the need to remove honey from the hive before treatment. Here in Greece I need to extract honey frequently to take advantage of the different nectar sources. I might just try Bee-Quick - but let me know how you get on with it first! Over to James Fischer . . . .

BEE-QUICK

Why Use It?

- Does your fume board repel YOU more than your it repels your bees?
- Are your bees more aggressive when blown at 100 mph by leaf blowers?
- Are you tired of jamming or useless bee-escapes?
- Are you terrorizing and killing bees trying to shake and brush them?

If you can answer yes to one or more of the above questions, then you should try Fischer's Bee-Quick.

Fischer's Bee-Quick is a safe, gentle, and pleasant way to harvest your honey. Safe for you, honey, & bees.

How Does It Work?

Fischer's Bee-Quick is a "bee repellent". It is used with a fume board. When exposed to air, the non-toxic liquid turns to a non-toxic vapor that smells good to you, but irritates bees. Bees move away from the fumes, and out of the topmost super directly under the fume board.

At higher temperatures, more vapor is produced, but Bee-Quick works even on cloudy days, and on days you might think "too cool" to harvest honey. (Even after a night in your freezer, Bee-Quick still "smells nice". If you can smell the vapors coming out of the bottle, the bees will take notice and evacuate supers.)

Don't use too much! Spray Bee-Quick in a zig-zag pattern, across the full width of the fume pad, including the spaces between the outer frames and the hive body, but don't overdo it. If you use too much, bees will start coming out of the hive entrance, just like beekeepers fleeing a gift shop that reeks with the scent of bayberry candles! The exact amount required will vary with temperature, the amount of sunshine on the fume board, and factors that makes bees reluctant to leave the super, such as uncapped honey or brood. In general, use less on hotter and/or sunnier days.

What's So Special About It?

Fischer's Bee-Quick is non-toxic. Unlike all other "bee repellents", you don't pay an extra $16.00 "Haz-Mat" Hazardous Materials handling fee when you have Bee-Quick shipped to you. This is because Bee-Quick is not hazardous.

Think about it. Do want highly toxic chemicals anywhere near your honey? Do you want to expose your bees to stuff that even the 6-foot, 250-pound UPS guy is afraid of? Neither did we. That's why we spent two years creating Bee-Quick.

Bee-Quick also smells nice. That's pretty special compared to "the other stuff". Don't believe us? Ask your spouse. (Perhaps you already have had a conversation that starts "Why do you smell like an elephant's outhouse?!!?" If so, use Bee-Quick and join your family again at harvest time.)

Another special thing about Bee-Quick is us. We are beekeepers. The makers of "the other stuff" are not. We put our family name on the label to show that we stand behind the product. We attend all the beekeeping conventions and meetings we can, and we want to hear from you. Like all of beekeeping, we started this venture with a conversation between beekeepers, and we want to keep the conversation going. Please tell us what you think, ask questions, and give us the benefit of your experience.

Where Can You Buy Fischer's Bee-Quick?

Not from us - we are beekeepers, like you.

Answering the phone, taking orders, taping-up boxes, and running down to UPS are not our idea of a good time.

We would rather be out in the apiary. Buy Fischer's Bee-Quick from:

A.I. Root OH USA www.airoot.com
800-289-7668

Bee-Commerce CT USA www.bee-commerce.com
800-784-1911 info@bee-commerce.com

B & B Honey Farm MN USA 507-896-4134
bbhoney@acegroup.cc

Blossomland Supply MI USA
www.blossomland.com 800-683-5808
info@blossomland.com

Brushy Mtn Bee Farm NC USA
www.beeequipment.com 800-233-7929
sales@beeequipment.com

Dadant & Sons USA (10 Locations)
www.dadant.com 800-637-7468
dadant@dadant.com

E. H. Thorne, Ltd UK (3 Locations)
www.thorne.co.uk 01673 858555
sales@thorne.co.uk

Fisher's Bee Supplies MO USA 816-532-4698

Glory Bee Foods OR USA
www.glorybee.com 800-456-7923
sales@glorybee.com

Mid-Con Agrimarketing KS USA www.mid-conagri.com
800-547-1392 mail@mid-conagri.com

Rossman Apiaries GA USA
www.gabees.com 800-333-7677
jrossman@surfsouth.com

Western Bee Supplies MT USA
www.westernbee.com 800-548-8440
stinger@centurytel.net

How Do I Use It?

Remove the bottle cap, and screw on the pointed spray cap. Place your fume board in the sun, cloth side down, allowing it to heat up. (Seriously consider painting your fume board black to maximize the sun's effect.) Smoke the hive entrance.

Spray Bee-Quick onto the cloth of the fume board, using a zigzag pattern. Be sure to go to the far edges of the cloth, and spread the spray evenly over the entire surface of the cloth. Don't spray too much. (If using a fume board that was used with other repellents, use a new cloth or pad. The old one will stay toxic and smell bad for a long, long time.)

Remove outer and inner covers. Smoke the bees on the top bars. Place the fume board on the top super, insuring that no large gaps result. Best results will be obtained on a sunny day, when the sun can heat the fume board. The super should be clear in from 3 to 5 minutes.

Repeat as required for more supers, only spraying more Bee-Quick when you notice that the fumes have subsided. Use more Bee-Quick when you wish to evacuate a brood chamber, since bees are very reluctant to abandon brood. If bees come pouring out of the entrance, you have sprayed far too much Bee-Quick, and should remove the fume board more quickly. Use less.

What About Other Alternatives?

As far as we know, the following are your honey-harvesting alternatives:

Bee Escapes

Blowers (Gas-Powered Leaf Blowers)

Butyric (The stuff that smells bad)

Benzaldehyde

Brushing Bees

What About Bee Escapes?

To our knowledge, there are three kinds of bee escapes:

- The ones that jam.
- The ones that prove that bees are smarter than you thought.
- The ones that use cones.

Seriously, we have yet to meet a beekeeper who liked making "two trips to the apiary", required even if the bee escape DOES work. We call our product "Bee-Quick" for a reason. Bee-Quick lets you remove supers right now, extract, and return empty drawn comb to the hives before the flow ends. This means less woodenware to manage, more honey from the same amount of drawn comb, and a lower overall cost of operations.

Bee-Quick also lets you lift a full super only once, when you remove it. No need to lift supers to place a bee-escape. As we grow older, even Illinois (medium) supers seem "heavy" to us when they are full. Maybe you can bench-press full deeps with ease. Good for you! How many? For how long? How old are you? Who is your chiropractor?

The "Porter" bee escape was apparently designed by a watchmaker with time on his hands, hoping that buyers of his bee escapes would pay him to "adjust" them every season. The big drawback to Porter bee escapes is the fact that one bee can get caught in the blasted thing, and all the bees above get trapped. (And no, we do not think that all those Porter-sized holes in store-bought inner covers are proof of a conspiracy, but we'd like to see at least two holes per inner cover in the interests of saving untold thousands of bees from untimely deaths by dehydration due to a single jammed Porter bee escape!)

There are many "maze" type bee escapes, but all of them take the form of a "bee intelligence test", designed by someone who thinks bees are stupid. Perhaps our (Buckfast) bees are smarter than most bees, but they can find their way back through every maze-type escape we have tried, and we have tried them all. (Heck, our bees find their way into our extracting room every summer, despite our best efforts to keep them out!)

There are also many "cone" type bee escapes, with either plastic or window-screen cones. The idea behind them seems to be that bees will force their way out through the cone, but will not force their way back in. In our view, the problem is that bees come in all ages and sizes, while the cones have only one size.

What About Leaf-Blowers?

So you have a Leaf Blower…

Great! Use it on dead things, like leaves, since they won't care if they are suddenly battered about by 100 mile-per-hour winds. Think we are exaggerating?

Have a friend operate the blower, and watch the bees in the super. Unless the frames are heavily propolized, the lighter frames will slap back and forth, killing bees. Watch the "stubborn" bees that somehow "hang on" to the comb. Watch their wings get damaged by the high-velocity airflow. Be sure to dodge the angry cloud of bees that results from blowing.

Is this beekeeping, or bee killing? You decide. We'd rather not watch, as we are fond of bees.

Oh, yeah... and if your blower breaks down, please don't ask us. We can't fix them either. We have enough trouble with the lawn mower. Sell your blower, and you will have enough money to buy a lifetime supply of Bee-Quick.

Using Bee-Quick is a much more pleasant way to harvest honey. You don't need earplugs, and you won't be breathing exhaust fumes. It is also much, much easier to start - simply squeeze the bottle.

What About Butyric?

Butyric Anhydride is sold under a number of different names. To us it smells worse than an elephant's outhouse, and even a tiny drop on your hand means that you will be sleeping in the garage tonight. It wont wash off! Expect even the dog to avoid you for a few days until the smell goes away.

More seriously, their label is chock-full of dire warnings, and all the bee catalogs charge an extra $16.00 to ship it as "Hazardous Materials".

Why? Because it IS hazardous material! If it is not safe for humans, how can it be safe near your honey or bees?

Think we are kidding? Here is the Material Safety Data Sheet for the chemical, courtesy of Cornell University. If you scroll through, you will find phrases like:

"INHALATION MAY BE FATAL"
"USE ONLY IN A CHEMICAL FUME HOOD"
"EXTREMELY DESTRUCTIVE TO TISSUE OF MUCOUS MEMBRANES, UPPER RESPIRATORY TRACT, EYES AND SKIN."
"COMBUSTIBLE MATERIAL. KEEP AWAY FROM HEAT AND OPEN FLAME."

Funny, we were not aware that a "chemical fume hood" was standard-issue beekeeping equipment.

The appropriate US Department of Transportation Haz-Mat Guide is here, listing the reasons why UPS, the EPA, Fed-X, and the US Postal Service would prefer that you buy Bee-Quick.

What About The Cherry-Scented Butyric?

Do you think the cherry smell helped? Spill some on your clothes, and you will soon be burning them. Before you buy any, ask the person selling it to get a bottle, and read the warnings on the label to you. Our bet is that they will refuse to do so on the grounds that even a factory-sealed bottle smells bad.

What About Benzaldehyde?

If you can't even pronounce it, do you really want it anywhere near your honey?

As with Butyric Anhydride, the DOT, UPS, Fed-X, and the Post Office all classify it as a

Hazardous Material. We don't think they are joking. Here's the "Material Safety Data Sheet".

If you scroll through, you find statements like:

"MAY CAUSE RESPIRATORY IRRITATION AND CNS (Central Nervous System) DEPRESSION"
"MAY CAUSE LIVER DAMAGE OR DERMATITIS"
If you look at the appropriate Department of Transportation Haz-Mat Guide, you can see that it is also highly flammable.
The biggest problem with benzaldehyde is the fact that it is an important component in the manufacture of illegal drugs like "methamphetamine". Even if you can convince someone to sell it to you, expect a visit from polite, young, clean-cut, and heavily-armed representatives of Alcohol, Tobacco, and Firearms (ATF), or worse yet, the Drug Enforcement Agency (DEA).
Neither group will be happy to see your 5,000 gallon supply of mead, and they won't believe that it is all for "personal use".

What About Bee-Brushes?

Don't get us wrong. We think that everyone should have a bee brush!

We simply feel that, if used as the sole bee removal method, shaking and brushing bees is too slow, and disrupts the hive too much. Like blowing bees, this method can result in a large cloud of bees, and they will harass you, your neighbors, and your neighbor's pets, all while seeking out the supers and frames from which you have just brushed bees.

This method also carries the risk (for novice beekeepers) of killing or maiming house bees on full frames.

Bee-Quick allows the majority of the house bees that store nectar and cap cells to stay in the hive and remain relatively undisturbed. We think that these younger bees will be more productive if you do not disrupt their working day with an unscheduled trip outside the hive and a close encounter with a bee-brush.

...(d) A product intended to force bees from hives for the collection of honey crops"

We asked them "but what if someone wants to insist that Bee-Quick MUST be a 'pesticide' of some sort?"

They smiled a condescending smile, and showed us another US Code section, Title 40, Part 180.1164, which says:

"...(d) Any edible food commodity... which is used as a pesticide is exempted from the requirement of a tolerance when used in accordance with good agricultural practices in or on all food commodities."

They then kicked us out of their offices and told us to take our bees with us.

Who's this "Fischer" person, anyway?

There is more than one us. Both the patriarch of the family and his son are named James, and just to make matters more confusing, we each keep bees at different apiaries. We are nobody important, and like it that way.

Where Did Bee-Quick Come From?

A brief history: Both beekeepers had difficulty in shaking and brushing bees at harvest. The son kept designing new and innovative escape boards, bought a very expensive, powerful, and noisy Stihl backpack-type blower, and after getting frustrated with each approach, bought a bottle of Butyric Anhydride. This small bottle could have led to a divorce, but for the tolerance of his long-suffering wife, who suggested that it be stored at the end of the farm furthest from the house, along with all the clothing to be worn when using the Butyric, preferably in a concrete bunker at least 20 feet underground. The patriarch stated that he started beekeeping for fun, and did not find the harvesting process "fun" at all. Thus, after long hours spent re-learning long-forgotten chemistry and countless late-night sessions in the lab, Bee-Quick was created and fine-tuned.

Why Such A Funny-Looking Bottle?

We don't call it "funny". We call it "pocket-sized". We actually thought about the bottle long and hard. We wanted something that could slide into a shirt pocket, fit in a tool belt, and stand up to being squeezed, all while looking good. We even thought about how much Bee-Quick a typical beekeeper would need in a season, and how much everyone dislikes storing things between seasons. We tried to create the best-packaged product since comb honey!

Why Isn't Bee-Quick Less Expensive?

Well, it is MUCH less expensive than other "bee repellents", when one looks at the total cost of using "the other stuff". We are not just talking about the Haz-Mat shipping fees, we are talking about costs like clothes that must be thrown away because you spilled Butyric on them, honey that was not made because you had could not harvest when you wanted and had run out of drawn comb, and so on. Bee Quick is even cheaper than fuel and maintenance for a leaf blower. We are hoping to sell a lot of Bee-Quick. If we do, we can get lower prices on the ingredients, the bottles, and the little spray caps, and we can then lower the price. We have no illusions about getting rich. (Heck, we are beekeepers, which is clear proof that we have little interest in fame, fortune, or a life of leisure!)

Can I Use Your Flying Bee On My Website?

While our bee is copyrighted, trademarked, and service marked, as long as you don't use it in connection with things for sale (or as our lawyer says, "in commerce") we don't mind at all. If you include a link to the Bee-Quick website, this will make us very happy.

What Is "Farmageddon"?

Its our farm, nestled in the Blue Ridge Mountains of Virginia. Its not a very big farm, but we're not very big on farming. The name alone says volumes about our success at farming so far. The bees really enjoy the wide variety of weeds and brambles that we produce no matter what we try to grow.

Post Script

Fischer's Bee-Quick is available from both Thorne (UK) and most all US beekeeping supply houses. Dealer inquires are welcomed. All profits from sales of Fischer's Bee-Quick are donated to the Eastern Apicultural Society's research fund, to supplant the meager public funding available to bee researchers. One can read more about the product at www.bee-quick.com All trademarks, images, text, concepts, intellectual property, and bad puns are protected by international law, the WTO, multinational peacekeeping forces, and a very bad-tempered dog.

The Fischer Alchemy 2001 Annual Report

Many corporations have their annual reports prepared by armies of public relations hacks and battalions of accountants, resulting in a document that is more puffery than fact, and stresses "corporate image" over simple unvarnished truth.

Recently, many of these same corporations have suddenly shuttered their doors, imposed layoffs, and left nothing behind but a bad taste in the mouths of the financial press. We see a connection here. You start by gilding the lily, soon you are embellishing the facts, and before long, you start to believe your own press releases.

That's not going to happen here at Fischer Alchemy. First, we don't have any investors, loans, junk bonds, shareholders, or vulture capitalists breathing down our necks. Second, we want to protect our good family name, and we suspect that being chased across the parking lot by Sam Donaldson on camera would not help.

Let's face it - 2001 was just about the worst year for a new product introduction since 1929. But did that stop us? Not a bit! We did very well for a product sold to beekeepers, one of the smallest and most miserly market segmentsknown. We have nothing to hide, so here is our annual report, with photographic evidence of our achievements.

Worldwide headquarters (top left)

Our executive headquarters, nestled in the Blue Ridge Mountains of Virginia, was recently renovated by the renowned architectural firm of Hurt & Proffitt to meet the stringent guidelines of the US Department of the Inferior® National Register of Hysteric PlacesSM.

Construction took more than four years, and no expense was spared to both restore the structure to historical accuracy, and harmonize and blend our offices with the surrounding community, avoiding the usual cold, sterile "office park" appearance affected by so many soulless multi-national corporations.

Telecommunications centre (top centre)

A 21st Century business must be equipped with the latest in telecommunications technology, and Fischer Alchemy is no exception. Here you can see our network operations center, staffed 24 hours a day, where our mainframes, networks, and real-time worldwide field sales support systems are monitored by talented and experienced engineers.

Research and development laboratory (top right)

Groundbreaking products like Fischer's Bee-Quick are not "discovered", they are invented.

Our R&D lab has extensive stocks of rare, imported all-natural ingredients, and we are equipped with every possible type of precision laboratory apparatus, making us capable of extreme accuracy in our stringent quality-control work.

Machine shop and prototyping laboratory (bottom right)

Like any technology-driven company, we feel that it is not enough to merely be "state of the art". Anyone can buy the newest machines, so we stay ahead of the competition, at the "bleeding edge" of technology and science at all times, by being able to custom-build our own solutions. Here our sophisticated and orderly machine shop is shown, where new ideas can be turned into tangible process improvements by our skilled team of engineers and craftsmen.

Employee facilities (bottm centre)

No company can claim to have a higher standard of employee job satisfaction. Even the "little things", like our elegant employee dining room show our concern for comfort.

Here a group of our production workers relax amidst the tasteful ambiance of an area of the dining room decorated in Laura Ashley prints and pastels.

Bottling plant – Unit 3 (top left)

The phenomenal success of Fischer's Bee-Quick has led us to several production line upgrades and expansions at our contract bottler in just the last year – this being their latest automated high-speed essential oil extraction, micro-encapsulation, pasteurization, mixing, and bottling equipment. Each unit was custom-made in Germany to our specifications by skilled old-world craftsmen.

Research scientists (bottom left)

Our young, highly educated team of scientists work constantly to develop new products for the beekeeper, and do basic research critical to our success and reputation as a leader in the R&D field. Here we see one of our scientists in our massive research library, which contains hardcopy, microfiche, and digital copies of every known beekeeping and entomology reference source ever printed in any language.

Finance department (page 31 bottom left)

While many high-tech companies met with financial disaster this year, we applied our frugality, uncanny foresight, and prudent reinvestment strategy to protect our financial standing, even in a sluggish economy. Here we see one of the many highly-sophisticated commodities traders that work in our finance department placing a forward-purchase option index contract to assure our price point on some of the more exotic ingredients we use in the exclusive proprietary formulation of Fischer's Bee-Quick.

Production planning (top centre)

When a product has seasonal demand, planning production capacity becomes a mission-critical process, where only best practices and ISO-9001 certified methods can be trusted to assure you of adequate supplies of Fischer's Bee-Quick. Here our chief production planner is studying the output of one of our newest supercomputers, displaying the results of a complex, multi-variable "what-if" scenario concerning the impact of a possible drought on product demand in the Southwestern region.

Packaging and shipping (below)

To assure that every container of Fischer's Bee-Quick will always arrive in perfect condition, our packaging engineers work round-the-clock to constantly improve our bottles, containers, case lots, and cargo containerization methods. Here we see a critical overseas express shipment being readied for loading in an air-freight container.

Board of directors (above)

The leadership of an organization of such importance to the entire beekeeping industry cannot be trusted to any one person, so we are blessed with a board of directors including such well-known luminaries that we need not even name them here. Their pictures alone should impress anyone who is familiar with the covers of the Financial Times, the Wall Street Journal, and the Police Gazette.

Here our board considers an insightful point made by our Chairman (second from right), who is using our conference facility's state-of-the-art, real-time, holographic 3 dimensional visual aid system. The exact words spoken as this historic photo was taken became our company motto: "Be the windshield, or be the bug."

Employee retirement plan (below)

Fischer Alchemy is run by three generations of Fischers, so we view all employees as true family members. The beneficence of our retirement plan is one of the major reasons why we can boast of negligible turn-over at all levels of the company. We provide for each and every member of every employee's family with comfort, dignity, and security in our on-campus elder-care and retirement facility, only steps away from office tower 3-C.

b O O K S

Control of varroa - a guide for New Zealand Beekeepers

Mark Goodwin and *Cliff Van Heaton*, Ministry of Agriculture and Forestry, New Zealand. ISBN No. 0-478-07958-3. 120 pages, Paperback, illustrated throughout.

New Zealand is renown and respected the world over for its tough and efficient programme for maintaining the health of its farming industry. And, over the past few years, its MAF have been pleased with the success of its new methods of dealing with American foul brood without the use of drugs, thus ensuring that honey remained one of the purest of nature's foods to be found on the nation's tables - and in the many countries to which the product is exported. The arrival then of varroa in 2000, sent a shockwave through the whole beekeeping industry for, from that time, beekeepers would have to resort to the use of chemicals if their colonies were to survive. It would mean a change, too, in beekeeping practice and profitability - and, as the authors say, "The success with which individual beekeepers meet the challenges ahead will depend on how well they are able to adapt to the changes required".

Fortunately, for NZ beekeepers, their country has been one of the last few to have been stricken by the mite. Thus, their beekeeping industry has access to a wealth of research, literature and methods of control on a global scale which will help enormously in their fight against varroa, and which the author/scientists, Mark Goodwin and Cliff Van Heaton (HortResearch New Zealand) have reviewed for this new publication.

A look at the contents list shows how wide ranging the book is: History of Varroa; Varroa Biology; Effects of Varroa; Varroa Population Growth; Detection and Evaluation of Infestations; Chemical Control; Chemical Resistance; Biotechnical Control; Breeding for Varroa Tolerance; Integrated Pest Management; Timing of Varroa Control; and Control Methods Used Overseas. Appendices give information on estimating hive populations; how to use formic acid, thymol and oxalic acid; testing varroa resistance to chemicals; and NZ regulations related to movement controls and varroa treatment. There is also a very useful bibliography for suggested reading, a glossary and index.

The information in the guide is presented very clearly so that particular topics are easily accessed and there are one sentence summaries at the end of each section. Charts, graphs and colour photographs enhance the text, clarifying the topics discussed and add enormously to the book's presentation.

Although the book is a review of varroosis, there is much detailed information which beekeepers might not have come across before and I was particularly interested in the thorough descriptions of organic methods of varroa control as practised in Denmark and Vietnam. Though the book is subtitled "A Guide for New Zealand Beekeepers" it will be found to be a useful and important up-to-date text wherever varroa occurs.

Essence & mechanism of nest abandonment by honeybee swarms

Zbigniew Lipinski (Poland)

This book won the Gold Medal at the Apimondia Congress in Durban 2001. A full review by Maciej Winiarski will appear in the May 2002 issue of The Beekeepers Quarterly.

Bee propolis - natural healing from the hive,

James Fearnley, Souvenir Press, 2001, Paperback, 172 pages.

"With the introduction of bee propolis, it is possible that we can one day abolish many drug-related chemicals and their side effects. Propolis works by raising the body's natural resistance to infection through stimulating one's immune system. In doing this, propolis also supplies added amounts of vitamins, and all essential minerals, including iron, calcium, aluminium, manganese, and silicon." Aargard and Chauvin.

Always there have been enormous claims for the outstanding ability of propolis to overcome ailments, some conditions which have been unaffected by contemporary medicine. At one time, so popular was the acclaim for the substance that propolis became a focus of great media attention - and it gave much publicity to the producers and suppliers of propolis-based products. However, what was important news to us in the western world at the end of the 20th century, was history to other nations, especially in eastern Europe, for their traditional medicine relied on hive products such as honey, propolis, pollen and bee venom :for them apitherapy was a way of life. The fact was that treating many ailments with propolis and other hive products simply worked.

James Fearnley, who has done much to advance the use of propolis through his Scarborough-based company, has now, in his book, given much information which is of use both to the general reader who wants to learn more about propolis and to the beekeeper who wants to make use of this valuable hive product. His book has a couple of introductory chapters on what propolis is and how it is used in the hive and then moves on to propolis and how it has been used in historical times. The major part of the book deals with the contemporary use of propolis, how it works and in which situations it has found to be successful in the treatment of both people and animals. As well as giving instructions for the collection and extraction of propolis many other uses are also described and the author gives many detailed recipes for making a multitude of products, especially those for treating various conditions. It is perhaps, with the latter, I would urge caution, for James Fearnley insists that propolis must be pure and adulterated if it is to be used medically, yet an ordinary beekeeper will not have access to the technology to assure himself that this is the case.

I am not as sceptical as some people as regards the value of propolis as my family use it constantly for cuts and ulcers. Indeed, when our dog had a severe leg injury and nothing, including steroids worked, propolis tincture applied twice a day cured the animal within two weeks.

This is a welcome book which is easy to read and fills a gap in beekeeping literature.

A taste of honey

by John Phipps

Going commercial

One of the most difficult and critical stages in a beekeeper's life is the time when he decides to go 'commercial'. Way back in the 1950's Manley stated that in order for a beekeeper to be able to make a successful career in honey farming three factors were of great importance:

1. having the right amount of experience
2. having the capital needed
3. having a good market for the hive products or services

- essentially all three of these are needed concurrently. Building up a large number of colonies is relatively easy in beekeeping, but the fact that you have accumulated a large number of colonies does not mean that you are ready to become a bee farmer. The question of hive numbers is, however, an important factor - but even then some beekeepers seem to do very well out of keeping a small number of hives intensively rather than having huge numbers scattered across the countryside. It is important to remember that every 'extra' hive is going to mean more manipulations, regular requeening and prophylactic treatments - each of these a drain on the beekeepers time and money and therefore on the profitability of the business.

At one particular point in my life I had between 50 and 70 hives all in National or Commercial hives. It is, of course, not a good idea to mix the types of hives that you have in apiaries, but even though the brood frames differed in size, at least the other hive parts were more or less interchangeable. These colonies were kept in apiaries of no more than ten in an arable part of Lincolnshire, with most of the honey coming from oil seed rape. Each summer I would take half of the colonies up to the heather. Almost every year they got sufficient winter stores and made good colonies in the spring, but only sometimes was there a surplus of cut comb honey. At this time I also had a full-time job with a lot of responsibility. My problem was how to expand my beekeeping whilst still working, so that it might build up into a business which could eventually be my chief source of income.

There were several limitations which I had to face head on. Lack of time was going to be an important one, finance was another and thirdly, was the need for me to investigate and secure more markets for my honey. Another thing I was certain of too - I did not wish to just add to my colonies and produce more and more of the same type of honey, the area was swamped with beekeepers already selling this type of honey and, to be fair, there was very little of anything else around anyway. In fact, when I look back now, my major 'assets' at the time were some experience of keeping many colonies and what I thought were some very good ideas.

My ideas were based along two lines, perhaps with another which could be used at a later stage:

First of all, I would cut my colonies down to just fifty hives and buy small amounts of many different types of honey, monofloral, if possible from elsewhere. I had already stayed with beekeepers in several different parts of Europe by then and liked very much the honeys which they produced. I was not, and I am still not, a great believer in the long held belief that "British Honey is the Best - by this I do not mean to 'knock' British honey, but to subscribe to that view, which was extremely prevalent then, is to demean the value of the produce ofour overseas colleagues.

Secondly, I would 'downpack' the imported honey - as well as my own - mainly into 28gm pots for which I would design my own packaging. The packages would then be sold either in 'up-market' food stores or by mail order, the latter which was becoming increasingly more popular for anniversaries and celebrations. By downpacking honey, although there would be more work, the honey would sell for a very high price and managable amounts could be taken as needed.

Thirdly, at a later stage and if the clientele eventually demanded it, I would supply them with full one pound (454g) jars of those honeys which they particularly liked.

Drawing up plans

My wife and I had already decided on a business name - "Honey Hunters", the very ambitious idea behind it being that eventually we would try and locate the source of any honey that was requested. We had an idea for the logo too; it would be based on a carved wooden bear that we picked up in an antique shop in Goslar, Germany.

As the bulk of my honey would be put into the plastic 28g pots I decided to develop two types of packaging, one would hold 12 pots, the other 30 pots (a month's supply of honey for breakfast or tea time).

The first box, to hold 12 pots, was very simple. It would be rectangular with space for three rows of four pots; it would have a strong lid which could be removed and slipped under the box bottom so that the contents

(top of page) The London store demanded a square jar and simple bold labelling. The jars were obtained from Thorne's of Wragby and the labels were designed and printed using a computer, the lettering being black on a yellow background.

Presentation box of French Honeys.

Some of our honey labels. Many of the monofloral honeys or those from specific regions had full colour labels. Honeys from different countries had the bear logo. All of these labels were designed locally and printed by Avery's in London.

For our market stall we downpacked our honey into the 42gm hexagonal or round glass jars as well as the 28gm minipots.

could be displayed; and there would be an inner, clear, perspex cover which would protect the pots.

The second type of packaging was much more complicated. I wanted it to be in the form of a dispenser which could be hung on the kitchen wall. It was to look attractive and resemble the pine tree from which the forest beekeepers cut out their combs. Each morning or afternoon, the recipient of the gift would be able to open the door in the tree hive and take out a pot of honey. As there were to be 30 types of honey in the dispenser, each day's honey would be of a different type and a surprise for the consumer.

Once my ideas were on paper, complete with the appropriate measurements, I contacted several box manufacturers before choosing one particular firm in Bradford for the work. They were extremely helpful throughout, except for one almost disastrous flaw at the end of the project. All the artwork - the logo design, the box decoration and tree motifs, as well as labels for the minipots was done by a local bank manager's wife who was starting out in that line of business. We had already set up a list of honey types which we knew were available and provided the artist with a supply of pictures to help her with the work.

The bank

I needed cash for the project - about £10,000. I needed to go to the bank (Manley would no doubt have shuddered at this point). However, I had security - plenty of it - a secure job and a good property. And £10,000 wasn't that much anyway - it was only the cost of a new car. One week after driving a new car you have lost a lot of money - but I knew that my business plan looked good and I would make a healthy profit - if everything went to plan. The bank manager thought so too - even though he knew nothing at all about honey. He was either captivated by my enthusiasm or knew that the bank's money was going to be safe given some security. The money would cover all the packaging and labels, the first batch of honey, the setting up of a honey house and equipping it and a bulk supply of pots and jars in different sizes. It would also pay for the launch of the enterprise.

VAT or not?

Before spending any money at all, I carefully weighed up the advantages/disadvantages of being VAT (value added tax) registered. There was no doubt in my mind that although it would perhaps take years before I reached the threshold when I would have to register, doing so straight away would be to my advantage. Not only would I receive the VAT back on all my purchases, this would extend too, (though proportionally) on my telephone bills, running my pick up truck, etc, yet I would not have to charge and eventually repay VAT on my products as they were classed as food. One disadvantage, of course, was that there would be more paper work - and that returns would have to be made each quarter. However, I thought that doing the paper work regularly would be a good thing and help me to keep on top of the business. I also employed an accountant who showed me how to keep my books and the firm would just check my VAT return and complete my annual tax form.

Searching for honey

Just before I started on the design stage of the project, I had contacted several beekeepers who advertised in "Abeilles de France" and asked them to send me samples of their honey. The greatest and most interesting range of honeys came from a beekeeper who lived in the Pyrenees, near Lourdes. As we had friends in Toulouse, we booked flights for a short holiday in the region and allowed ourselves three days with the beekeeper, who was just a couple of hours away by train. In that short time we learned a lot about French beekeeping, travelling from one large apiary to another, and spending time in the huge honey house sampling even more varieties of honey. We put together a first order - just 15 x 35kg and settled all the paperwork there and then. Each pail of honey contained clean, well-filtered honey just ready for bottling and some of the types we chose were honey from rhododendron (not the poisonous variety!), fir trees, bell heather (moorland), ling, sea holly, lime tree, sunflower, lavender, cherry, and spring mountain flowers. We also arranged transportation. A haulage firm across the road from us in our village made the trip down to Spain once every fortnight and would collect the two pallet loads on the way back - only adding a hour or so of driving for the slight diversion.

On our return to the UK we also ordered honey from British packers thus adding to our list of honeys Mexican, Orange Blossom, Caribbean, New Zealand Clover, Tasmanian Leatherwood, Guatemalan, Chinese, Australian Bluebell and Canadian - all available in 25kg tubs.

Within a short time we added many French 'herb' honeys to our list and manuka, from New Zealand which was in great demand after Peter Nolan's work on honey ans stomach ulcers.

The honey house

I needed a purpose-built honey house, but time and money were at a premium. Fortunately, I already had a concrete pad next to our house which would make a good base. It had formerly served as a base for a greenhouse made by the previous owner (I pulled it down as it was hideous - it was made of panels of perspex of different thicknesses and shapes gleaned from an old Lancaster aeroplane factory). I chose the easiest and cheapest solution, a pre-cast concrete garage 5m x 3m, but with a standard door fitted to the front instead of a full-width one for a car. I painted the inside walls as well as the floor - as the surfaces were very powdery - and made a false bee-proof roof. Both water and electricity were nearby so fitting these was not a problem.

Christmas Tree dispenser/package for 28 one ounce (28gm) pots of honey which could be mounted on a kitchen wall.

The branches and bear could be cut out and then slotted into ready made cuts on the tree box.

Three banks of power points were fitted and all lights were shielded with plastic shades. I had a large galvanised sink - big enough for washing 35 kg containers - made to my own design at a local metalworker's yard. One side of the honey house was utilised for storage of large honey pails, an extractor and steel shelves for finished products, whilst opposite this was a bench for uncapping combs or bottling honey. Under the bench I had a row of honey warming boxes, bought from Thorne's, but extended in height with 'lifts' so that they would accommodate the larger tubs. I bought two pieces of equipment for the honey house - an electric zapper to kill flying insects and a Danish bottling machine which could be calibrated to fill even 28gm pots.

Before I used the honey house I went and asked the local environmental health officer to come and inspect the building. Legislation for honey processing areas and their inspection was quite new at the time of the officer's visit. He knew nothing about honey except that it was in the 'low risk' category of foods. I soon realised that anyone fearing an inspection has no need to worry - as long as their honey-handling premises are clean and tidy. The important things were all in order - washing facilities were good (both hot and cold water), worktops, walls, ceilings and floors were all easy to clean, light bulbs were shielded, there was adequate light and ventilation (but who opens the honey house window during extracting?), electric points were safe and earthed - and he liked the zapper and first aid kit which, apparently, weren't essential. I was given a score of 100%. I asked him how low the mark needed to be for an inspection to fail. He said if it had only been 60% - he would have had to put me on his list for a visit in a year's time. Even hotels and restaurants in that category are given a chance to improve - but in a shorter space of time. Even then, though, the inspectors must make an appointment - they cannot make spot checks.

Our First Shot at the Market

One of the difficulties of introducing a new range of products on to the market is that you cannot hawk them around to shops until you finally have the finished products in your hands. It's no good going to retailers and saying "I'm thinking of expanding my range of products - I'm going to put them in packs like this . . . are you interested?" Nine times out of ten you will be told to come back later. I knew that there would be some time between having my products to show potential customers and sending them to food magazines and Sunday supplements before I would get any return on my investment. However, I had, I believed, one golden opportunity for launching the business - the Lincoln Christmas Market. Thousands of people from many parts of the UK, and abroad, are attracted to this annual event. From the picturesque castle and cathedral area and all down Steep Hill crowds throng amongst the craft and food stalls. Food, beer and gifts from Germany, hot potatoes and chestnuts, French crepes, roast boar, speciality foods, Christmal Carols, Morris Men - the range of products and entertainment is enormous. What an opportunity! I paid my £200 and constructed a market stall out of iron and plastic at the front of which would be an enormous trestle table that I would borrow from school.

Ten days before the market I still hadn't the boxes I had ordered. All the honey was waiting on shelves - hundreds of pots of 30 varieties of honey, all labelled and ready for packing. After a series of phone calls I was told that the boxes would be brought the following evening. That was OK, I thought as I still had one weekend before the market. The packaging looked superb when at last it arrived. When filled with a dozen varieties the rectangular presentation boxes looked really attractive. I then began to fill the 'Christmas Tree' dispenser - and realised very quickly that something was wrong - this box would only hold 28 instead of the labelled '30 varieties'.

I had a problem - or the company had. To this day, I believe they made the wrong measurements as they had the empty pots to take back to their design room. I suppose I could have, then and there, said - 'Take them back, they are not what I ordered'. But I had all that honey on the shelves and the prospect of a good market just a few days away. The director, (he'd overseen the whole project from start to finish and had brought the packages himself), absolved himself of any responsibility and said that he would have a new label produced for the following day and sent over by courier - and that this could be placed over the incorrect labelling. I wasn't happy - I had planned for a 30 day supply of honey - and based my costings on 30 pots, but I was in a very difficult situation. I opted for the new label and I'm sure the director sighed with relief.

I do not want to dwell much on the Lincoln Christmas Market. It was a spectacular failure. I was unfortunate enough, like twenty other stall holders, to have a very bad position in a small car park at the side of the castle. It was at this point that many people disembarked from their coaches and used it as a thoroughfare. Many people stopped briefly for a cursory look and said that they would return later, some commented on how pretty our products were and said it was a pity I wasn't selling jam! We stood and stamped our feet in the cold thick fog for 28 hours hardly selling a thing. On the second day, the seller of baked potaoes sold all his potatoes to a man in Castle Square who had already sold what he thought would be enough for the three days. Both my wife and I joined the Breton pancake maker from time to time - swopping products instead of cash. And what had people bought chiefly at the Christmas market? The top seller was a Christmas hat carrying the words of a song which was then in vogue: "I'm too sexy for my hat".

Recuperation

Needless to say, we were totally numbed by our lack of success at what should have been an extremely lucrative market. If you can't sell gifts like the ones we had designed at Christmas time, then the future of the whole business looked pretty bleak. In an attempt to get some cash back I managed to sell some boxes to some garden centres and up-market delicatessens, but local sales were very limited. I had already sent out gift backs for review in magazines and newspapers, yet I knew I couldn't afford to sit around and wait for the outcome - something more positive needed to be done - and quickly, for the bank needed to be paid each month. For the short term, we placed some adverts in the Sunday newspapers saying that we would send our

gift boxes directly by post to the intended recipients. The cost of each box, including package and postage was £7.75. We had a good number of responses which was encouraging. However, we soon realised that this method of sale was only good if we persisted with our advertising - but the rates were really too expensive.

Our next line of attack was one that we had intended to do all along, but had no time to do before Christmas - trying to get our gift boxes into one of the top London stores. We tried three. All of the buyers were impressed with our range and packaging - but in each case the answer was the same: "We will get in touch with you". Feeling flat, but not totally disappointed, we got on with more bottling and packing and I had time to produce a brochure which attempted to give interesting descriptions of each of the honeys we sold. The information included the geographic area the honey came from, the nectar source(s), descriptions of the taste, colour, and texture, and also some ideas how the various honeys could be used.

Within two or three months, several food writers wrote favourable descriptions of our products and the market picked up a bit. Buying over the telephone was a problem for many customers as we were unable to accept credit card payment. In the case of emergency, we sent out the product before a cheque arrived - and only once did we not receive payment.

A new direction

One afternoon we received a telephone call from one of the prestigious London stores. They wanted to see us as they wished to order some of our products. Sadly, although they like the gift boxes they had something else in mind. They were building a new top-floor 'grocery' shop to compete with another famous nearby store. They wanted to stock all our range - but in one pound jars. Their requirements were specific as regards both the jars and labels. The jars had to be glass and square and the labels both plain and simple. The initial order was to be large and after that they expected to buy about 1000 jars from us each month. We went home with a lot to think about. It was good to receive such an order, but it meant changing the way our business was intended to go. By down-packing honey into 28gm pots I was getting a very good return on the 336 gm in each gift pack - some 150 - 200%. The problem was though, I wasn't selling enough of them. On the other hand, I would have the opportunity of selling my own two lines of honey in a top notch store. And, I thought, it must be good to have a flexible approach to business and, surely, being adaptable and taking opportunities when they crop up is a key to success.

So, we decided to go ahead with the store's ideas - except we had to compromise on the pots - we used square plastic ones from Thorne's. My wife was asked to go to London to train the staff on how to sell the honey - and how to answer questions customers were most likely to ask. Also, not long after the store opened, we went to London again - but this time to set up a honey tasting stall. We found that the experience confirmed our belief that the gift packs would sell. OK, we found that shoppers tasted some of the honeys and then went and bought a jar or two of the one pound sizes - but most of the customers wanted to buy the gift packs - which, unfortunately, were not for sale. Many of the people who came to our stall were not the Saturday grocery shopping crowd, but tourists or business people looking for a gift to take home and our boxes were far more interesting and would travel better than just a jar of honey. We could not convince the floor manager at the end of the day - but at least we had managed to hand out some of our brochures.

Media Interest

Suddenly, radio and television heard about our products. Radio 4 wanted a sample box for their food programme and Carlton TV wanted to make a film about our business. The BBC telephoned me just as I came in from work. They wanted the box the next day to be opened live on Derek Cooper's programme. I took the package straight away to the local post office so that I could arrange for next day delivery. It was impossible. I was advised to go to the main post office in Gainsborough. I made it by 4.45pm. There was long queue and out of the five positions only two were manned. I don't know how I kept my patience - I knew that for guaranteed next day delivery the package had to be at the counter by 5.00pm. My turn came seven minutes after that - I was too late, the woman said, and no, they would not send it Express Post. It was immutable. I'd just have to risk First Class Mail. I was speechless! Fortunately, the honey arrived in time, we had good coverage and we had a fair number of enquiries.

The television programme was a success too. We had a very pleasant day with Tony Francis, who directs and produces "Heart of the Country" for Carlton TV, and his team including a novice reporter - who unfortunately got stung twice. We looked into bee hives, talked about the different types of honey and sampled them, and ate and drank products made from particular monofloral honeys. Interestingly, we received request for full-size jars of honey relating to the recipes we used for the televised food - eg lavender honey for ice cream, dark fir tree honey for the fresh pineapple and yoghurt sweet, lime tree honey for the honey lemonade, rhododendron honey for tea, and Caribbean honey for the rich, spicy walnut and honey cake. If people catch on to a recipe they will demand the right type of honey and thus a market can be created.

Disaster and recession

We started our business at a very difficult time - in the middle of one of the worst recessions. However, with orders coming in from London and with slow, but steady sales of gift boxes we were quite hopeful about the future. We asked the London store how things were going - and they were pleased too and said that we could confidently order more honey so that there would be no lack of continuity in supply. This was extremely important. Some of the honey we procured from the Pyrenees and Provence could not be relied on every season and one of our main suppliers was going to cut down on some of the specialist monofloral honeys as he had trouble selling it in France. He saw his future in putting most of his 3000 stocks onto sunflowers and going for bulk sales. I had to buy more honey very quickly - and made my biggest (but unavoidable mistake). I went back to the bank.

The bank saw no problem in supplying me with more cash to meet the honey bill, so I ordered what I needed. When I went to arrange collection with my haulage friend across the road from me, I had a shock. They were no longer going to Spain. As a result of minimum wage agreements, the catalogue

supply company was no longer buying clothes and leather goods from Spain as the labour costs were too high - they were now trading in Asia. However, by using a couple of hauliers, I managed to get the honey, but at double the transportation cost. Problem over. I continued to supply London with the honey but two months later they did not re-order - ever! We found out, they did not tell us, that they were now sourcing the honey themselves and selling it under their own label.

There was just one glimmer of hope. I recieved a fax from Malta for 1000 jars of honey - and if they liked it they would order more. I had not contemplated exporting before and had a lot of paper work to sort out before the deal could be completed. All was ready, when I received a final fax - apparently from the one of the food ministers in Malta - which requested a health certificate stating that the whole consignment of honey " must not have come from any colonies which had had any disease of any type for the three years prior to harvesting". This included the foulbroods, chalkbrood, nosema and, of course, varroa. It was impossible. I faxed my supplier. He had 3000 colonies in many apiaries from the Atlantic seaboard to the Mediterranean. Three days later I received a certificate of health from the French veterinary service endorsing the excellent health of all the colonies over the last three years! My customer in Malta was pleased with the honey - and wanted more. However, unreasonable officialdom made further exports impossible and I was still left with a huge amount of honey and no market.

The market stall

Admittedly, one of my biggest mistakes was to put most of my stock into one store (which requested exclusivity) - despite an uncle of mine who was in business and who had advised me that you should never put more than than 20 - 30% of your stock to one outlet. However, we were in a depression and times were hard and it was too easy for me to swallow the bait. I knew of commercial beekeepers who were almost doubling their mileage each year in seeking out and supplying retail outlets as the local demand for their produce had diminished.

In order to try and get rid of much of the honey, I took over a stall in the enclosed Butter Market in Newark, Nottinghamshire, and every Saturday for 15 months my wife and I sold our products there. Despite the poor returns on many a Saturday, we enjoyed the market enormously. We made our stall as interesting as possible, gave away free sample pots of new varieties to our regular customers and enjoyed talking to everyone who stopped at the stall. We made and sold candles, many of which my wife covered with dried pressed flowers and tiny leaves that were then dipped once more in wax for a protective, but transparent coat. To increase our turnover on the candles we combed market stalls, car boot sales and even antique shops for candelabra, and candlesticks - and old brass ones, complete with beeswax candles, were snapped up very quickly. We also carried a range of Willie Robson's cosmetics - the peppermint foot cream, I remember, was always popular as, too, were the handcreams. To make our stall more interesting and to educate the public, I would take along an observation hive or a microscope so that people could watch the bees and get a greatly magnified view of varroa. We really had a good time and met many interesting people including David Cramp who later became our Spanish correspondent for The Beekeepers' Quarterly. But what struck me most about the market was the other stallholders. There in the middle of the recession they would work hard at selling their crafts, antiques, books, clothes - though always, it seemed, that the odds were against them. Each week they gave themselves a reason why they had made little money - it was the third week in the month and the people hadn't been paid yet; it was the beginning of the school term and money had to be spent on school uniform; it was summer and people were saving for their holidays: always there was an excuse. No matter what, they kept cheerful and confident and hopeful always of a better time ahead. We didn't have their stickability and when our range of products diminished we left the market for ever.

Post script

It is easy to look back now and analyse what went wrong. Undoubtedly, we made mistakes but we were trying just too hard when market forces were against us and eventually we had no energy or wish to continue. We could have sold more products by mail order, but at the time the cost of advertising and the small response it brought just didn't make it worthwhile. I still think our ideas were sound and given the present market and means of shopping on-line we would probably have had more success. Regrets? Surprisingly, not many. We learned many aspects of developing and running a business and came into contact with people whom we would never ever had the opportunity of dealing with. We are very open people - not naive- yet we tend to trust people until they let us down. But we prefer it that way. Yes, we learned a lot about business and people, we were able to utilise our creative flare and communication skills effectively and we made many, many friends. It was an invaluable experience.

The development of the Kiwifruit Pollination Association

Cliff Van Eaton, Professional Apiculturalist. Tauranga, New Zealand

This article is the first of a two part series on commercial pollination services in New Zealand. The second part will focus on hive standards and hive auditing. The series was first presented to members of the Commercial Pollination Association of Australia in August 2000.

Although this article is about how the biggest pollination association in New Zealand came into being, lets forget about beekeeping for moment.

Imagine instead that you are in some other line of business and that you need to rent a used car. The car has to really be a good one, since the success of your business depends on it getting you from A to B without fail.

Now imagine putting your business at stake on this used car when you can't even look under the bonnet. And even if you could, the running parts are so strange you wouldn't be able to tell a good one from a bad one. Finally, imagine having to pay 80% of the market value of that car just to rent it for 2 to 3 weeks.

Faced with this sort of situation, it goes without saying that a car rental company would have a major image problem. How do they get the public to trust that their cars were reliable, and how do they get customers to understand that the costs of running the rental company mean that even at 80% of the market value, the rental fee is fair and reasonable?

Sounds crazy, doesn't it? But this was exactly the situation beekeepers in the Bay of Plenty area of New Zealand faced in the early 1980's. And of course it all had to do with an unusual horticultural crop called kiwifruit.

Pollinating an "unusual" plant

"Unusual" is an apt description because of the unique nature of the kiwifruit plant. Kiwifruit produces no nectar, is dioecious (ie, it has separate male and female plants) and requires a high level of pollen transfer to produce a properly sized and shaped fruit. A well-pollinated kiwifruit contains between 1000-1400 seeds. By contrast, a well-pollinated apple needs only 6-7 seeds.

As it turns out, honey bees are by far and away the best commercial pollinators of the plant, but pollination certainly isn't straightforward. How could it be with no nectar to attract the bees, and male and female flowers on separate plants. Again, it's the unusualness of kiwifruit that makes it all work. Because not only do the males flowers produce pollen, the females do, too. To be sure, the female pollen is sterile. But it is still attractive enough to bees to get them to fly from a male flower to a female and pollinate.

In the early 1970's, New Zealand researchers carried out honey bee pollination trials on kiwifruit and in 1974 a colony density of 8 hives per hectare was recommended for mature orchards. The recommendation was far greater than for most other horticultural crops, but it reflected the need for a high number of foraging bees since 1) pollen was the only attractant for pollination, and 2) so much pollen needed to be transferred from one flower to another.

Riding the kiwifruit boom

For New Zealand beekeepers, not only was there an unusual crop with fairly unique pollination requirements, there was also a boom in plantings. By the beginning of the 1980's, kiwifruit was a highly sought-after commodity, especially among sophisticated consumers in European markets. Prices for the fruit skyrocketed, and the fortunate growers who had planted orchards in the mid-70's saw both their incomes and property values increase almost beyond imagining.

There followed what can only be described as a modem day "land rush", with dairy and sheep farms in areas with the required combination of good soils and -warm temperatures purchased at prices far above their productive value.

Even though establishment costs for the crop were extremely high, plantings of kiwifruit increased 15 fold in the 10 year period 1975-85, levelling off at just under 8000 hectares. Total returns also increased dramatically, and by 1991 kiwifruit was worth NZ$660 million per year.

As more and more kiwifruit plantings came into production in New Zealand, the demand for pollination hives escalated sharply, and a boom in both -hive numbers and new commercial beekeepers occurred in the early 1980's. A report prepared by government financial analysts, and highly debated at the time, suggested that the New Zealand beekeeping industry could not cope with the hive increases and predicted a significant shortfall in hive requirements by 1990. The report was used to justify a multi-million dollar research project to develop artificial pollination systems.

But the New Zealand beekeeping industry more than met the challenge, with hive numbers nationwide increasing, by 45% to 340,000 in just 7 years (1981-1987). And the mechanism that made such rapid development possible was simple - the price of pollination fees.

Major agricultural lending institutions in New Zealand, including the government owned Rural Bank, refused to take security over beehives, so the only alternative was to increase hive rental prices to cover development costs. As a result, during the height of the boom the kiwifruit pollination fee sometimes even reached the market value of used hives (NZ$85-$100).

At the same time, the boom saw a number of young commercial beekeepers enter the scene, with new ideas and often a more business-like approach. For many of these beekeepers, kiwifruit pollination fees represented the bulk of their income.

Pollination quality assurance was rarely a problem during the boom days of kiwifruit. Growers were just happy to have enough hives, and price really wasn't an object since returns from the fruit were so high. Many growers also didn't have enough expence to know if they really had a pollination problem.

The need for quality assurance

However, the boom couldn't last forever, and in the mid -1980s the New Zealand industry began to have to cope with lower levels of profitability while, at the same. time facing increased competion from overseas. By the early 1990s New Zealand only produced about 1/3, of worlds kiwifruit, with Italy a bigger producer.

The industry went through a time of soul-searching, and created a single organisation controlling exports (the Kiwifruit Marketing

Board, now called Zespri) The board, realising that the New Zealand product continued to hold a position of quality at the top end of the world market, decided to follow a strategy of maintaining product returns through strict adherence to quality control.

As a result, quality has become the byword in all aspects of the industry. Ever-stricter standards are being used in both production and packing to ensure that the fruit is of the best size and shape and reaches the consumer in the best possible condition. The quality assurance system is enforced by an extensive array of checks and audits. Depending on the year, 15-20% of the crop is rejected during the packing process, and a further 10-15% culled either in New Zealand cool storage or after the product has reached its overseas destination.

Quality assurance and pollination

So what does this have to do with pollination? The overwhelming emphasis on fruit shape and size meant a new interest and emphasis on pollination, since many people in the industry see pollination as the essential requirement for the production of high quality fruit (ie, big size and proper shape). There is no doubt that an export size fruit requires a certain number of seeds, and the number of seeds is directly dependent on pollination. Other factors such as plant nutrition, sunlight, etc., are also very important, but suffice it to say that without proper pollination you can't get large volumes of export fruit.

Growers went to great lengths (including artificial pollination) to achieve "optimum pollination results". At the same time pollination was often blamed for quality defects which upon analysis turned out to be caused by other factors. Despite that, packhouses, consultants and even the Board continued to list many quality defects under the broad heading "pollination".

So, given this major emphasis on quality assurance in the kiwifruit industry, and given a reduction in profitability, kiwifruit growers and their advisors began to cast a more critical eye on pollination and the beehives that did the job. How could they know whether a beehive was a "good" one or not? They weren't in a position to "look under the bonnet" , and there was conflicting advice about whether watching bees at the entrance, or watching bees on flowers, provided any good indication about the pollination that was taking place in the orchard.

There were also some horror stories, it has to be said, of dead or almost dead hives being put into orchards. Needless, to say, these stories travelled like wild-fire, and were certainly embellished in the re-telling.

By the-mid-1980s, New Zealand beekeepers government advisors became concerned with the lack of any defined hive strength standard for kiwifruit. They believed such a standard was important, because: a) growers needed assurance that pollination fees paid were justified, and b) it was felt the right "size hive made a significant difference in pollinating a crop that didn't produce nectar.

So in 1985 the NZ Ministry of Agriculture developed a recommendation for kiwifruit pollination hives based on pollen collection studies carried out by researchers, and a world-wide literature search.

The development of pollination associations

At the same time, beekeepers in the major kiwifruit growing areas of the Bay of Plenty, Northland, Auckland and Hawkes Bay began discussing what could be done to improve the image of their industries. There were those horror stories, to be sure, but there was also an increasing demand from growers for beekeepers to justify their prices. After all, didn't beekeepers just pick up their hives from the paddock and drop them in the orchards for a while? And didn't they need a place to put their hives anyway? Some growers even suggested that the beekeepers should be paying them, since their hives would be producing honey while they were in the orchards (even though, of course, kiwifruit produced no nectar).

Regardless of all the grower field days and extension article es and government advisors, there was still a profound lack of knowledge by growers about how honey bees pollinated kiwifruit, and also about what beekeepers did to prepare their hives and how they made their living.

Clearly, the beekeepers had a difficult problem, especially since they couldn't afford substantial price decreases. Many of them had financed the development of their businesses on pollination fees, and it became obvious as the decade went on that a pollination fee of about $80 was necessary just to break even for the year. It was also obvious that kiwifruit pollination reduced honey production on average by about 10kg per hive. This was substantial, given that average New Zealand honey production is about 30kg per hive.

The National Beekeepers' Association (NBA) branch structure was the initial focal point of these pollination beekeeper discussions, but finally in each area beekeepers decided to create pollination associations independent of the NBA.

The Kiwifruit Pollination Association

The Kiwifruit Pollination Association (KPA) was the biggest organisation of its type at the time of formation, and it has stood the test of time, remaining viable and effective over the last 15 years.

The KPA was founded in the early 1980's with great enthusiasm, and with a membership comprising almost all beekeepers engaged, in kiwifruit pollination in the Bay of Plenty. Like all good associations, one of its first activities was to develop a set of rules. The rules give a good idea of initially why the association was formed.

"The objects for which the Association is established, are:

a) to bring together beekeepers engaged in or intending to be engaged in the supply of beehives to kiwifruit orchards to further the knowledge of those beekeepers. in relation to kiwifruit pollination.

b) To encourage cooperation among beekeepers supplying hives to kiwifruit orchards and to promote the efficient and profitable conduct of the kiwifruit pollination industry.

c) To promote honey bees as pollinators

d) To encourage -the co-operation of orchardists in accepting their responsibilities to the beekeeper, particularly in the use of sprays

e) To encourage members of the Association to act as a united group where spray poisoning of bees occurs

f) To promote good beekeeping practices among members with a view to providing efficient and effective pollination services to kiwifruit growers, so furthering the confidence of growers and others in the ability of Association members to provide the best pollination service."

The association recognised that while there was a lack of knowledge by growers of the realities of pollination, there was, also a substantial need to improve the knowledge of pollination beekeepers. This is a key thread that has carried through the KPA to this day.

There was also an acknowledgment of the need to promote pollination services to the horticultural community, and the KPA was instrumental over a number of years in holding field days on kiwifruit pollination and hive standards.

Finally there was a strong emphasis in the rules on the need to protect bees from pesticides, This was a major problem in the early days of kiwifruit production in New Zealand. The KPA liaised with local Fruitgrowers' Federation offices, and maps were kept showing where hives were in orchards and when they went out. Growers would call the office to see whether it was safe to spray both pre- and post-blossom insecticides.

Interestingly, however, hive poisoning in kiwifruit has been greatly reduced, mostly as a result of changes in chemical use (which is now much lower) and the spray calender. Bee deaths still occur, but they are mostly associated with the use of surfactants (wetting agents) in fungicides applied during pollination.

The KPA and Pollination Hive-Quality Assurance

What's missing from the KPA rules objects, and what proved extremely controversial, was the auditing programme. Under anoth-

er section of the rules, every member agreed to have any of their hives independently inspected for quality assurance during the period the hives were in the orchard for pollination. And if the orchardist wasn't happy with the standard of the hives, the beekeeper was to "sort out any problems to the satisfaction of both parties." The rules also included a mediation procedure for disputes that could not be resolved. Finally, there was provision to either terminate a beekeeper's membership, or place restrictions on that membership if the member was found guilty of "conduct prejudicial to the interests of the Association".

It was the auditing programme and this potential for sanctions (the "teeth" of the rules) that caused so much controversy in the KPA. It led to some of the most boisterous and antagonistic meetings ever held between beekeepers in New Zealand, and eventually caused a number of beekeepers, who were opposed to having standards enforced on them by their peers, to leave the association.

The problem was that beekeepers joined the association for various reasons, and they also brought with them the set of values and understandings that they used in running the NIBA. These included open (and in fact compulsory) membership and looking first and foremost after the beekeeper's interests.

KPA members argued that the only way to develop and protect their image in the greater kiwifruit industry was to show growers that they really meant business; that by using an auditing system for hive strength they had the grower's interests at heart . In effect, they wanted to provide growers with a means of looking under the bonnet . They also wanted growers to know that they would enforce the standards if the "car" wasn't capable of getting the grower from "A to B".

Those beekeepers who left the KPA argued that the KPA shouldn't be allowed to impose such standards. They said that the pollination service was a private business arrangement between the grower and the beekeeper, and other beekeepers through the KPA shouldn't interfere.

Looking back, the best thing that could have happened was for those beekeepers to leave the KPA who didn't agree with group enforcement of standards. By leaving, they allowed. those beekeepers who were sincere in their intent to build a credible, quality assurance based pollination association to get on with the job.

Management Systems Audit

The KPA today is a different association from the one described in the 1984 set of rules. In the early 1990's, association members realised that while "end point" inspection (auditing of beehives) was a starting point, it had its weaknesses, and didn't do much to help improve the performance and knowledge of members. They therefore decided to add a management systems audit similar in concept to the one used in packhouses by the Kiwifruit Marketing Board. The audit is based on principles outlined in the ISO 9002 standard (a universal quality assurance system) and includes documenting of the processes involved in producing quality assured hives.

Each August, members fill out a 6-8 page confidential questionnaire that is designed to highlight shortcomings in their beekeeping systems. The questionnaires are reviewed by an independent auditor who writes a detailed reply discussing any problems with the member concerned.

Based on these management system checks, the auditor then determines a more targeted program of product (hive) auditing. Inspectors employed by the association conduct these less expensive audits once the hives are placed in the orchard.

The management systems audit sounds a bit onerous, and it was also the subject of dispute in the early days of the KPA. But those who have taken part have found that it is actually a very important component of their yearly beekeeping management. The questionnaire is sent out after the annual KPA field day, where members get the latest information on kiwifruit pollination, and discuss issues of importance facing their businesses. In the questionnaire, members get a chance to review important points made in the field day, and check management details with the auditor. For most members, it's a welcome "tune-up"' on such things as hive standards before the season begins.

The questionnaire has also become an important means of collecting statistics on kiwifruit pollination (ie. average price charged, average number of hives per hectare used etc.,) and on beekeeping best practice (ie. number of hives requeened, number of replacement nucs made). These statistics can be extremely useful, both on an industry-wide basis, and to individual beekeepers.

Pollination Professionals

As a result of the systems audit, KPA members are really no longer beekeepers providing hives to pollination. They are seen, and see themselves, as kiwifruit pollination professionals who use beehives manipulated and managed in a certain way to achieve the desired result of optimum fruit set and greater returns for the grower.

One of the obvious indicators of this change is the fact that KPA members tend to provide services to many of the largest, most professional kiwifruit growers in the Bay of Plenty. Most of these growers are actually large companies that manage multiple orchards for their owners, and also maintain packhouses and coolstores. The companies have become successful by their professional approach to kiwifruit growing, and their ability to work within the strict quality assurance framework imposed by the Marketing Board. These growers aren't interested in playing beekeepers off against each other looking for a lower price. They want a professional service they can rely on that is based on hive quality assurance and that uses the best beekeeping management techniques.

Instrumental insemination:

innovations in techniques and equipment - the new compact, versatile right & left-handed Schley model II instrument

Control of mating is the basic foundation of all stock improvement programs. Instrumental insemination is an essential tool for honey bee breeding. This is an increasingly necessity with the need to select, develop and maintain stocks displaying resistance to pests and diseases.

Today, improvements in techniques and equipment design make this procedure easier to learn and use. A high rate of success and queen performance levels similar to naturally mated queens can be consistently attained.

There are a variety of instruments available, which range in cost, quality and ease of use. The choice can make a difference in the success or frustration of using this procedure. The technique is delicate and requires precision and accuracy in fine movements. High repeatability and a wide range of movement are also important features.

The Schley instrument, modelled after the original Ruttner device, is unique in its evolution of innovations and improvements. In 25 years of insemination equipment design, Prof. Peter Schley is continuously making modifications and upgrades. As new findings on the natural mating process are revealed, he strives to simulate this, upgrading and improving techniques and instrumentation.

The Schley models are known for their perfection in machining, offering precision control of very fine movements. Micromanipulators provide ease of handling and high repeatability of the procedure. The wide range of movement and flexibility in adjustments stand out as unique and valued features. Schley's most recent new model offers impressive versatility and creative new options.

The new compact SCHLEY Model II insemination instrument

Innovative in design, the new Schley Model II instrument is easily adjustable for both right and left hand users. This can be used in the standard position or turned 90° for use in a frontal angle. The queen can also be rotated 180° for orientation similar to natural mating. The individual, varied and changing preferences of users are well accommodated with this new instrument.

The compact, new size of the Model II allows a wide range of microscopes types to be used. This also eliminates any interference with microscope knobs that sometimes restricted the range of syringe movement in the standard model. The new instrument fits on the base plate of most microscope stands, rather then over the plate as the standard model, in Fig.1.

The Model II has a flatter and narrower base and is shorter in height. The outside dimensions are 25 mm in height, 56 mm width and 155 mm in length, as compared to the standard 40 mm X 66 mm X 250 mm instrument.

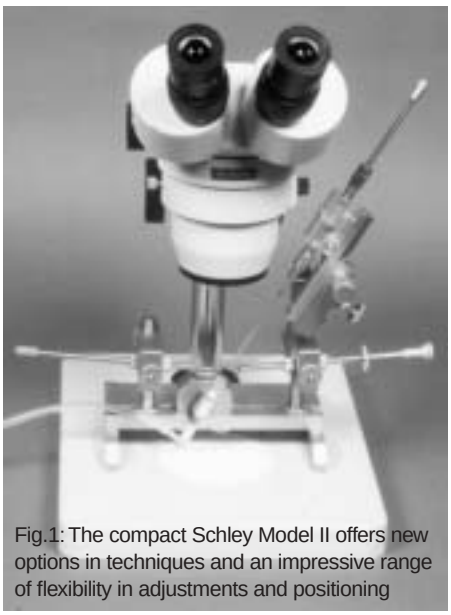

Fig.1: The compact Schley Model II offers new options in techniques and an impressive range of flexibility in adjustments and positioning

Fig.2: The Schley Model II in the alternative frontal position, for the left hand user. The forceps pressure grip is positioned 90 ° to the left.

Increased stability of the shorter base is provided by crosswise extension of the feet.

The basic functionality of the components of the Schley instrument have not changed. The new instrument can be handled in the same manner as the standard instrument, with the additional new options. The proven standard model, with the larger and heavier base, is still available.

Innovations for the left-handed user

The Model II instrument, placed at the 90° positioning, provides convenience and ease of use by both right and left-handers. The hook holding block can be attached on either side of the instrument as in Fig. 2. The attachment screw for the syringe holder is also exchanged between sides. The adjusting knob for syringe positioning is accessible from either side.

The short support post, originally located to the left of the standard instrument, is now in the new frontal position. The view of the inseminator is in harmony with the direction of the queen holder and syringe, which makes orientation easier.

Choice of various sting hooks and forceps

Various types of hooks and forceps can be used to open the queen's vaginal chamber. These new options are largely determined by personal preference and based upon positioning in a more natural manner. The perforated sting hook has principally replaced the standard flared hook. The sting structure is lifted upward, stretching the tissue to more easily bypass the valve fold and deliver semen directly into the oviduct.

This advantage is also obtained with the use of a hand held pair of fine forceps, which is becoming a popular technique. An innovative alternative to this is the pressure grip forceps, pictured in Fig. 4 and Fig. 5. For ease of use, Schley designed this to fit into the hook holder assembly.

Alternative instrument positioning based on natural mating

The new options in positioning of the queen and hooks are based upon observations of natural mating. During standard instrumental insemination procedures, the queen is positioned on her back. The queen actually mates in the opposite orientation, as the drone grasps her in flight and falls backwards after eversion of the endophallus, as illustrated in Fig. 6.

Fig 4: The Pressure grip forceps, an alternative option to the standard sting hooks. The tiny forceps are designed to lift the sting with push button control

fig. 5: To more closely simulate natural mating, the queen holding tube is positioned 180° from the standard previously used. The hooks are reversed, the pressure grip forceps are on the left and the ventral hook to the right

To more closely simulate natural mating, the queen holding tube can be positioned 180° from the standard used. The hooks are reversed, the sting hook or forceps placed on the left and the ventral hook to the right, as in Fig.5. A comparison of the two positions is diagramed in Fig. 7.

The new positioning is advantageous in that the hook support block can be lowered to increase the working space of the syringe. Another advantage is the ability to move the sting hook support block very close towards the queen holder. This creates a more favorable lever ratio of 2:1 and increases ease of handling.

Using traditional methods a 70° angle is favored. With the alternate 180° queen positioning, a lower angle of 65° to 60° is preferred, as in Fig. 7. The alternate positioning requires enlarging and shortening the queen holding tube. The queen must fit loosely, without pressure on the abdomen, and not too deeply in the tube. The holding tube, guided by an O-ring, maintains 3 to 4 abdominal segments protruding from the opening.

Optional manipulation with two or three hooks

The flexibility in instrument adjustments offers new choices in the use of hooks and forceps. The inseminator can use the standard set of hooks, or the ventral hook with pressure forceps grip. In addition, 3 manipulators can be used, two ventral hooks and the pressure grip forceps. Using this technique, the vaginal chamber is opened with two ventral hooks and the sting manipulated with a third hook or forceps mounted at 90°. For the beginner, just learning the technique, this can be an advantage as free-hand movements are eliminated.

Free-hand work is also possible. The inseminator can use a ventral hook and a pair of hand held forceps to lift the sting. For this technique, one of the holding blocks can be removed. The forceps pressure grip can also be used in this manner. The versatility of this instrument allows the inseminator to explore a variety of techniques, and the beginner to progress into an experienced operator.

The New CO_2 Flow Rate Adapter

Another innovation is the Schley CO_2 Flow Rate Adapter, diagramed in Fig. 8. CO_2 is used to anesthetize the queen during the insemination procedure. This devise acts as a pressure valve to regulates the flow rate delivered to the queen, preventing overdosing and irregular flow. The need to determine the flow rate by peculating gas in a water filled flask or use of a flow meter is eliminated.

The adapter contains 2 colored balls for adjustment. For a low and even CO_2 rate, gas is release as necessary until both balls rise up to the top. The flow is then reduced so that the blue ball falls and the green ball remains at the top. In this position the correct flow is delivered.

Conclusion

The experience of teaching the technique of instrumental insemination, working with numerous students with different needs and preferences has greatly contributed to the development and continued innovations of the Schley instruments. Each improvement made has led to additional changes in the on-going process to perfect the procedure and equipment.

Research findings that reveal new details about the natural mating process have been incorporated into the instrumentation. Consequently, today the technique is easier to learn and perform with consistency. Precision machining combined with the features and options mentioned provide an effective and efficient tool for controlled mating. The new Schley Model II instrument stands out in providing versatility in techniques, adjustments and positioning.

The beginner can try various techniques, find their personal preferences and gain efficiency and accuracy with the options this instrument provides. It is an essential skill for the serious bee breeder. Today, the procedure is easier to learn and use with these improvements and innovations.

For more information on equipment details, availability and insemination training, contact the authors.

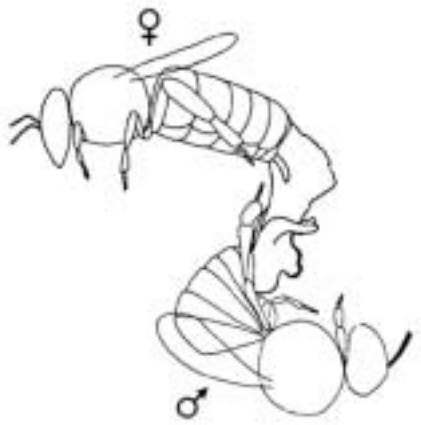

Fig. 6: Mating Diagram
The new alternatives in positioning for instrumental insemination are based upon observations of natural mating. The drone grasps the queen in flight and falls backwards after ejaculation. *Drawing by G. Koeniger.*

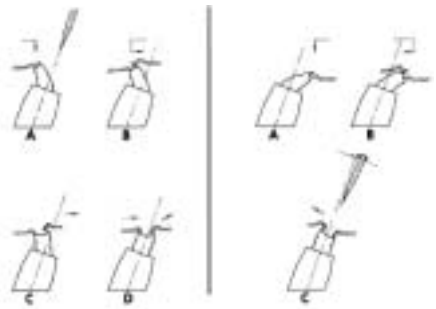

Fig 7: Hook Alt. diagram
A comparison of queen and hook positioning. Pictured left in A - D , the queen's sting and sting hook or forceps are placed to the right side. The alternative positioning based on natural mating, is pictured to the right in A - C, the queen's sting and sting hook or forceps are positioned to the left.

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Staff Apiarist at Ohio State University since 1990, Susan coordinates and provides technical support for research projects related to honey bee behavior and stock improvement. She also instructs classes in instrumental insemination, bee breeding and queen rearing at OSU and internationally.

A major focus continues to be the New World Carniolan Program, founded in 1982 in California, as part of a diverse beekeeping and specialty fruit business. The program now serves as an educational tool and provides breeding stock to the industry. Selection for resistance to pests and diseases, and the use of bio-technical controls are aimed to eliminate routine chemical treatment.

Her background includes research and commercial interests. She worked at the USDA Bee Breeding & Stock Research Center in Baton Rouge, LA and the Honey Bee Lab. at Univ. of California, Davis. She also worked as a beekeeper for for Genetic Systems, Inc. in, FL., Wenner Honey Farm Inc. in CA. and Kendal Apiaries in, MT.

Prof. Dr. Peter Schley

Prof. Schley has been working to perfect and improve the design of instrumentation and the technique of instrumental insemination since 1980. He also offers training classes in this procedure. Currently he is at the University of Giessen in Germany, where his field of activity is maintaining and breeding small animals.