



RIRDC Honeybee R&D News is the official newsletter of the Rural Industries Research and Development Corporation Honeybee Program

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Des Cannon, Chairman

Chairman's Foreword

Welcome to the first issue of the RIRDC Honeybee R&D News. The RIRDC Honeybee R&D Committee has for many years followed a policy of actively promoting the outcomes of its program to the Australian honeybee industry. Members of the committee attend and give presentations to every state and national conference, and the final reports published for each project undertaken are made available for perusal and purchase at these conferences.

The ongoing drought of the past seven years has affected the Committee's budget, but this has in part been compensated by the industry's willingness to increase its own compulsory levy to fund its research program. The honeybee R&D levy increased from 0.8c / kg to 1.2c/kg in 2006-07 and will increase further to 1.5c per kg in 2009. The Australian Government matches the monies spent on R&D on a dollar-for-dollar basis, the net effect resulting in the honeybee R&D budget for 2008-09 being approximately \$550,000.

A full list of projects being funded by the program is shown on page four.

The end of 2008 also marked the beginning of a new RIRDC Research Manager for the Honeybee Program. In 2005-08 the program was managed by Margie Thomson, who put in an enormous amount of work on behalf of the industry. Margie is to be particularly thanked for her role in getting *Pollination Australia* up and running. Margie is still with RIRDC, but the new Research Manager will be David Dall (see page two for David's profile).

The coming years see the honeybee industry in Australia facing a number of challenges. Small hive beetle is increasingly having a negative effect on hive health, especially in the coastal areas from Bateman's Bay up to Queensland. We have now found *Nosema ceranae* in Australia, and we will be learning as much as possible about this 'new' form of *Nosema*, whilst at the same time we monitor its spread and increase. We are also still trying to eradicate *Apis cerana* from the Cairns area. The industry

is coming to grips with the ongoing drought, associated pollen shortages and a depressed honey market. The Committee is trying to do all it can to assist the industry in its efforts to increase productivity and economic returns over the coming months.

The HBRDC will be holding a *Researcher's Field Day* the day before 2009 NSW Conference. The Research Committee extends a welcome to EVERYONE to attend this field day. This will be an opportunity for beekeepers to meet the researchers in Australia carrying out RIRDC-funded bee research. Each researcher will give a short presentation on their project. *More information will be in the next R&D News.*

This issue of the RIRDC Honeybee R&D News marks a landmark for the Honeybee R&D Program. From 2001-05, the R&D Committee published an *R&D Update* annually, but no update has been available to the Australian honeybee industry since May 2005. In an effort to improve communication within the industry, the Committee will now be publishing the *R&D News* on a quarterly basis, and the *News* will be circulated to the ABK, as well as all state newsletters, for distribution. It will also be sent to Government organisations, companies and individuals on the RIRDC honeybee mailing database. If you would like to be added to the database, please contact Lea Edwards on 02 6271 4132 or lea.edwards@rirdc.gov.au

Current R&D Committee

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Denis Anderson (W) (02) 6246 4148
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Bruce White (02) 9634 6792

Research Manager

David Dall (02) 6271 4128

Program Coordinator

Lea Edwards (02) 6271 4132

In consultation with industry, RIRDC's Board reappointed Des Cannon as Chair for another term (to June 30th, 2011). The Committee is due for reappointment in June 2009. Current members are eligible for reappointment, although others may apply.



Commercial Honey Testing

The HBRDC has for some time been trying to assist producers and packers who have been looking for a commercial laboratory to take on testing of honey samples for a range of tests. The main criteria is that the lab tests be repeatable, consistent and to an international standard. Hopefully, Novost Pty Ltd will be able to assist in this regard. Novost will be able to carry out antibiotic activity, peroxide and non-peroxide tests by agar well diffusion against *S. aureus* as well as Methylglyoxal (MGO) by HPLC as per Prof. Henle's protocol.

For more information contact Charles Dragar PhD on, Mob 0408 129733 or at novost@internode.on.net



David Dall

Industry Profile

David Dall joined RIRDC in October 2008 as a Senior Research Manager, taking over responsibility for the Corporation's Honeybee R&D Program from Margie Thomson.

David's previous experience has appropriately prepared him for this role, having previously done research on insects and their diseases for

some twenty years. His PhD study at the Department of Entomology, Waite Agricultural Research Institute, Adelaide, was on the topic of the pathology of sacbrood and Kashmir bee viruses,

so that he joins us with some familiarity with important aspects of the industry.

David then went on to work on insect-associated or transmitted viruses for another two decades, firstly in the USA, and then at CSIRO Entomology in Canberra. At CSIRO he worked, in particular, on genetic manipulation of

entomopoxviruses for biocontrol of caterpillars and other pests.

Since 2002 David has worked in the private sector as Managing Director of Pestat Pty Ltd, a Canberra-based science R&D company that develops and commercialises technologies for management of invasive vertebrate pests such as foxes and cane toads. His experience in, and understanding of the rigours of life in the small business environment are also likely to assist his inputs to our R&D Program.

We welcome David on board, and look forward to future productive interactions with him.

Nosema ceranae

RESEARCH UPDATE

Nosemosis is the most important adult bee disease. Until 1994 it was thought to be caused by one *Nosema* sp, *Nosema apis*, a microscopic parasite. However, in 1994 a parasite similar to *N. apis* was found in the Asian honeybee *Apis cerana*. This parasite called *Nosema ceranae* was found in European honeybees in Taiwan in 2005 and more recently in the European honeybee in the USA and much of Europe. To date, non specific symptoms, such as a gradual depopulation of bees, higher autumn/winter colony deaths or low honey production have been associated with the presence of this parasite. None of the dysentery or crawling bee behaviour which is sometimes associated with *N. apis* infection has been reported.

Although *N. ceranae* has only recently been discovered in European honeybees, a retrospective study of bee samples collected from 1995 to 2007 in the USA have demonstrated that this organism has infected bees in the USA since 1996, almost 10 years before it was first discovered in the European honeybee in the USA. The delay in the detection of *N. ceranae* in the European honeybee is most likely due to the fact that molecular techniques are required to definitively diagnose the infection. These techniques



have only recently been applied for the differentiation between *N. apis* and *N. ceranae*.

N. ceranae has also been associated with colony collapse disorder (CCD), a condition which has devastated the beekeeping industry in the USA, Canada and some European countries through the loss of many thousands of hives. *N. ceranae* is an important pathogen of honeybees. However, the detection of *N. ceranae* in bees in five states in Australia indicates that any attempt at eradication would be futile. Overseas reports indicate that *N. ceranae* is more pathogenic than *N. apis*.

The emergence of this new pathogen in bees in Australia is likely to be more detrimental to the beekeeping industry in Australia than *N. apis*. It also appears that *N. ceranae* is replacing *N. apis* in Queensland. Further studies are proposed to monitor the impact of *N. ceranae* on honeybee colonies and to determine how lethal *N. ceranae* isolates in Australia are to bees. *N. ceranae* has not been detected in bees in Western Australia.

2008 Highlights



Eucalyptus leucoxylon

Program highlights in the past year include:

- The formation of Pollination Australia, an alliance linking the Honeybee Industries and the Horticultural Industries in Australia (see Update below)
- Publishing final reports for :
 - *Semen Production in Drone Honeybees* 08/130
 - *Australian Honeybee Industry Survey 2006–07* 08/170
 - *Does Nosema ceranae Infect Bees and Contaminate Honey in Australia?* 08/133
- *Flowering Ecology of Honey-Producing Flora in South-East Australia* 08/098
- *Sustainable Control of Small Hive Beetle Through Targeting In-ground Stages* 08/115
- *Introduction and Performance of Queen Bees - Introductory Apiary Status and Post Introduction Results* 08/099
- *Development of Two Markers for Hygienic Behaviour of Honeybees* 08/092
- *Securing Long-Term Floral Resources for the Honeybee* 08/087
- *A Study of New Zealand Beekeeping —Lessons for Australia* 08/060
- *Pollination Australia - Education and Training* 08/059
- *Pollination Australia Biosecurity Risk Management* 08/054
- *Pollination Australia - Research and Development Priorities* 08/055
- *A Survey of the Fatty Acid Composition of Australian Pollens* 08/034
- *Nosema Disease- Literature review and three year survey of beekeepers - Part 2* 08/006
- *The Effect of High and Low Fat Pollens on Honeybee Longevity* 08/031

Pollination Australia

Update

Five honeybee project applications are currently under consideration, as summarised below:

Five Year Pollination R&D Strategic Plan & related Communication Plan

This project is to be funded by RIRDC's \$50,000 contribution. It is aimed to build a business case for investment in the program over the next five years .

Future Horticulture Industry investment in this program is required for continuity. Further to this, funding has been allocated by RIRDC for direct communication at the Horticulture Industry Advisory Committee meetings prior to April 2009, enabling presentation of the *Pollination Five Year R&D Plan*, underpinning a request for continued funding commitment.

Simulation Exercise

This project aims to undertake an emergency response exercise, simulating a Varroa mite incursion, with a view to testing preparedness and existing decision making processes. The project will have an initial workshop focussing on eradication and containment strategies, followed by a second exercise with a focus on both short and long-term management, with a view to developing a National Management Plan.

Bioeconomic Model

This project aims to develop a model tool and collect relevant data in order to model the spread of Varroa mite incursion and consequent impact on Australia's horticultural production. This model could then be used to assess economic impact of various quarantine decisions in the event of a Varroa mite incursion.

Economic Impact Assessment

This project aims to utilise data generated in the Bioeconomic modelling project and input into ABARE's "Ausregion" tool, in order to quantify the total economic impact of this reduction in horticultural output.

Surveillance Review

This project aims to undertake a comprehensive assessment of potential surveillance measures, outlining the related costs, benefits and risks associated various strategies by exploring the strengths and weaknesses of the range of surveillance strategy options. Ultimately the project will result in the development of a business case for investment in a recommended Australian surveillance program.

Expected key outputs for 2008–09

- Identification of biological control options for chalkbrood and small hive beetle
- Testing completed pollen substitutes for nutritional value
- Determination of the value adding potential of the prebiotic components of honey
- Production of a report outlining the therapeutic properties of honey
- Completion of the final report on forest plantations and honeybees
- Provision of support for research extension, adoption, dissemination and exchange

New projects for for 2008–09

- A study of *Nosema ceranae* in Australia. Researcher: Michael Hornitzky NSW DPI
- Hygienic behaviour of the Western Australia bee breeding program. Researcher: Rob Manning WADPI
- Pollination five-year plan. Researcher: Michael Clarke AgEconPlus
- Evaluation of anti-Varroa boards for increase in honey production. Researcher: Robert Spooner-Hart UWNSW
- Varroa mite in Papua-New Guinea—consequences for Australian agriculture. Researcher: Saul Cunningham CSIRO



Overseas research

(Source: Journal of Agricultural and Food Chemistry. Co-authors were Carolyn Rasmussen of Kraft Foods, Sophia Leung of Newlywed Foods, Lia M. Andrae-Nightingale, a former University of Illinois graduate student, and Xiao-Hong Wang and Shelly J. Schmidt of the University of Illinois. Reprinted with permission from Nicki Engeseth and Phyllis Picklesimer)

Antioxidant-rich honey is a healthy alternative to chemical additives and refined sweeteners in commercial salad dressings, said a new University of Illinois study. “To capitalize on the positive health effects of honey, we experimented with using honey in salad dressings,” said Nicki Engeseth, a U of I associate professor of food chemistry. “We found that the antioxidants in honey protected the quality of the salad dressings for up to nine months while sweetening them naturally.”

Engeseth’s study substituted honey for EDTA, an additive used to keep the oils in salad dressings from oxidizing, and high-fructose corn syrup, used by many commercial salad-dressing producers to sweeten their salad dressing recipes. “We chose clover and blueberry honeys for the study after an analysis of the sweetening potential, antioxidant activity, and phenolic profiles of 19 honeys with varying characteristics,” said the scientist. The dressings were



Antioxidant-rich honey is a healthy alternative to chemical additives and refined sweeteners in commercial salad dressings

also compared to a control dressing that contained ingredients found in current commercial salad dressings, she said.

Engeseth explained a problem the scientists encountered in using honey in a salad dressing system.

“Salad dressings are emulsions—they contain oil and water; and to keep these ingredients together in one phase, manufacturers rely on emulsifiers and thickening agents to avoid thinning of the dressing and separation of the oil and water phase,” she said. When the researchers found that enzymes in the honey broke the emulsion by attacking the starch that was used to thicken the dressing, they came up with a new formulation that used xanthan gum as a thickening agent, which they then used in all the dressings, she said.

The researchers then stored the dressings under various conditions, including

37 degrees Celsius (accelerated storage) for six weeks and 23 degrees Celsius and 4 degrees Celsius for one year, followed by an evaluation of their oxidative stability. “After nine months of storage, both types of honey were as effective as EDTA in protecting against oxidation or spoilage. Blueberry honey performed slightly better than clover,” she said.

Engeseth said that many consumers prefer products with natural ingredients and that salad dressings made with honey should appeal to these consumers. “There’s such a wide range of salad dressings on the market—some unique salad dressings as well as inexpensive products that perform beautifully. If manufacturers are interested in developing salad dressings that have a healthy twist, we’ve demonstrated that using honey as both an antioxidant and a sweetener is one way to do this,” she said.