

----- Original Message -----

From:

To: rrat@sen.gov.au

Sent: Friday, March 28, 2014 8:52 AM

Subject: Fw: Varroa mite on major crops pollinated by honey bees in SA

Mr Tim Watling

I wish to submit the attached document to the committee for inclusion in the submissions.

The value of the managed honey bee has increased in South Australia since the paper was presented due to the following conditions

Drought has caused a reduction in feral bee numbers due the lack of flowering melliferous plants

Bush fires have burnt huge areas of SA where feral bees provided the pollination.(These areas will not repopulate for many years)

The areas of new orchards have increased dramatically increasing the demand for pollination services

The average age of the apiarist is increasing every year with very few young people joining the industry due to the difficult conditions.ie costs, disease threats and low returns.

The restricted access to native vegetation necessary to support healthy bees

Leigh Duffield



Potential impact of Varroa mite on major crops pollinated by honey bees in South Australia

Varroa mite is already in many of Australia's neighbouring countries. Should it arrive in Australia, it is expected that Varroa mite will have a significant impact on the wild European honeybee populations that growers of a range of crops rely on for pollination.

Varroa mite is also expected to cause significant damage to the managed honeybee industry, impacting on those growers who utilise managed hives for pollination services.

The apiary industry will be seriously affected by the loss of productivity and increased costs of management practices associated with this pest. The yield and quality of all crops pollinated by the European honeybee will also be significantly impacted.

This paper provides a rudimentary estimate of the maximum possible impact of Varroa.

The New Zealand Experience

Varroa mite is now spread widely through New Zealand, as far south as Canterbury, on the South Island. It has substantially decreased the number of bees in managed and feral hives, which in turn impacts the potential yield of pollination dependant crops.

The Economic Impact Assessment (MAF, 2000) in New Zealand evaluated three scenarios for each of the horticulture, pastoral, arable crop and apiary sectors. An update was prepared by Simpson (2003).

Current information on the New Zealand experience, including economic analyses is available at <http://www.biosecurity.govt.nz/pests/varroa>.

The value of honeybees in SA crops

Honeybee pollination is essential to a number of horticulture and agriculture crops. In 2006-2007 the value of production for pollination dependant horticultural crops in South Australia was estimated to be \$292m. The field crops of lucerne seed, canola, faba beans and peas were valued at \$195m.

Many horticulture crops rely heavily on pollination from honeybees, with, in some instances, almost total crop failure in the absence of honeybees as pollinators. Almonds are one such crop, and although all almond growers place bees in their orchards for pollination, it is likely that some growers use less than the recommended number of hives per hectare.

While a number of apple growers place hives in orchards, most rely on incidental pollination from wild honeybee populations. Most apple orchards in the Adelaide Hills have significant areas of native vegetation nearby that contain wild bees. Similarly, many citrus, stone fruit and vegetable growers rely on incidental pollination from wild bees.

A maximum loss of \$261m has been estimated for horticulture crops in the absence of bees for pollination. In reality, Varroa will spread in patches, reducing feral hive numbers over a period of several months to a few years. While most growers will have the opportunity to arrange for

managed hives to be placed for pollination, the numbers of managed hives is also expected to decrease.

Research in field crops such as canola, beans and peas shows that there are yield advantages in placing hives nearby for pollination. While wind and flies are responsible for most pollination, moderate losses only would be expected in the absence of wild bee populations. A maximum potential loss of \$60m could be attributable in field crops, with almost complete loss (\$22m) in the lucerne seed industry.

Note that only the value of potential crop losses are included in this estimation. Additional economic and social multiplier effects (approx 5x) will result should packing sheds and processing facilities close as a result.

Figures were not available for the clovers and pasture seed sector, which would increase the total estimated loss and increase the number of hives required.

Economics of honeybees as pollinators and the Varroa mite

In 2006-07, there were 727 registered beekeepers in South Australia, which manage a total of 65,651 hives. The total number of beekeepers is steadily declining. Of these 727, only 154 have 100 or more hives and are considered to be commercial beekeepers. Only 7 beekeepers manage more than 1,000 hives each. Table 1 show the number of hives kept in South Australia.

Table 1: Numbers of apiarists and hives in SA (2006-07)

	Total	
No. Hives	No. Apiarists	No. Hives
0	11	0
1 - 19	483	3,050
20 - 49	44	1,360
50 - 99	35	2,371
100 - 499	116	27,807
500 - 999	29	18,813
1000+	9	12,250
Total	727	65,651

While it may appear that the number of hives meets the estimated need for horticulture crops (with a large shortfall for field crops), Varroa mite will impact on managed hives, and a number of beekeepers are expected to exit the industry rather than incur additional costs to manage hives.

A number of small beekeepers maintain hives in the metropolitan area. Should Varroa mite eliminate wild hives and small backyard hives in the metropolitan area, many backyard fruits and vegetables would not be pollinated. The SA Centre for Economic Studies in 1997 estimated the value of backyard fruit and vegetable production in metropolitan Adelaide to be \$13.2m. Although many larger backyards have since been subdivided, many people are again taking an interest in backyard fruit and vegetable growing in response to rising food prices.

Beekeepers currently charge around \$50-\$65 per hive placed for pollination. While some crops, such as lucerne can produce high quality honey, bees placed in almonds require supplementary feeding to maintain the health of the hives. In the case of almonds, beekeepers may charge \$350 per hectare for pollination, yet the return to almond growers on this investment is over \$15,000/ha.

In New Zealand, management practices adopted for Varroa mite initially added up to \$55 per hive. With new treatments, this cost is now between \$20 and \$40 per hive (MAF, 2002).

Pollination Australia – a national approach

Pollination Australia was formed on 1 July 2008 with support from Rural Industries Research and Development Corporation (RIRDC) and Horticulture Australia Ltd (HAL). Its charter is to prepare Australia's apiary and pollination dependent plant industries for an incursion of Varroa mite and other potential biosecurity risks.

For further information on Pollination Australia, and various reports and plans, refer to <http://www.rirdc.gov.au/programs/hb.html>

Potential demand for pollination services

It is estimated that around two thirds of the 65,000 managed hives in South Australia are currently used for paid pollination of horticulture crops. Many hives are placed (without payment) in field crops (canola and lucerne) during a recovery phase following pollination of other horticulture crops.

A single hive may be able to pollinate two or three crops per year, depending on the time of flowering and the type of crop. An apiarist requires about eight weeks notice to prepare a hive for a pollination assignment, although it takes up to five months to prepare a hive for pollination of almonds. A hive is then effective for four to six weeks from placement in a crop, after which a recovery period is often required to rebuild the strength of the hive. Some recovery can occur on lucerne, lupins and faba beans; however the majority of preparation and recovery of hives occurs on native vegetation, where some plants are almost always in flower. The projected increase in the required numbers of hives will increase the demand on access to areas of native vegetation for preparation and recovery of hives, as well as providing pollination services to the areas of native vegetation where Varroa mite has removed wild bee populations.

The calculations in the following table show that up to 400,000 pollination assignments may be required to maintain current levels of production in the horticulture and the grains industries in the absence of wild bees as pollinators. Since the period of flowering for some crops is spread out, it is estimated that a peak demand of around 200,000 hives in August, or an additional 135,000+ hives may be required in South Australia

Varroa mite is expected to effectively remove wild bee populations in one to four years from being introduced to a local area. While this provides a window for apiarists to begin to multiply hives, managed hives will also be susceptible to Varroa mite. Apiarists managing hives for pollination and with a Varroa mite control program in place to maintain the health of the hives are likely to charge \$120-150 or more per hive (based on the experience in other countries).

Preparing for Varroa mite

The SA Honey Bee Strategic Plan Implementation Committee, the SA Apiarists Association and Pollination Australia are encouraging the apiary industry stakeholders to prepare for a possible future incursion of Varroa mite by informing themselves of early detection signs and management processes to reduce the impact of the mite on managed hives, as well as engaging the horticulture industry to better understand the role of and requirement for managed pollination services to ensure continued production of fruits and vegetables.

Table 1: Impact of Honeybee Pollination - South Australia (2006/2007 Data)

	Yield '000 kg/ha	Production '000 kg	\$/kg	Value \$ '000	Total ha (10)	Reliance on Pollination % (7)	Potential Impact \$ '000	Hives/h a	Theoretical no. of hives required
Horticulture Crops									
Nuts									
Almonds(11)	2.5	10,080	6.05	60,984	5,519	100	60,984	7	38,633
Pome fruits									
Apples (1)	30	27,529	1.99	55,782	917	90	50,204	5	4,585
Pears (1)	40	5,782	1.53	8,846	145	50	4,423	2	290
Stone fruits									
Avocados (1,12)	10	1,920	2.90	5,568	192	100	5,568	5	960
Apricots (1,12)	4.4	3,827	3.33	12,743	866	70	8,920	3	2,598
Cherries (1)	3.5	1,649	5.80	9,564	471	90	8,608	5	2,355
Nectarines (1,12)	14	2,292	2.15	4,927	161	60	2,956	3	483
Peaches (1,12)	5	2,175	1.10	2,392	433	60	1,435	3	1,299
Plums and prunes (1,12)	3.3	932	1.60	1,491	286	70	1,043	3	858
Citrus fruits									
Citrus fruit (2,12)	21.2	165,000	0.49	80,850	7,768	30	24,255	2	15,536
Berry crops									
Strawberries (1)	24	2,096	4.31	9,033	86	40	3,613	3	258
Blueberry (1)	1	10	15.68	157	10	100	157	3	30
Vegetable crops									
Asparagus (1)	5	2	4.50	9	0.4	90	8	2	1
Marrows and squashes (1)	2.5	500	1.37	685	199	10	69	7	1,393
Pumpkins (1)	19	8,513	0.33	2,809	448	90	2,528	7	3,136
Water melon (1)	40	3,284	0.65	2,134	82	70	1,494	7	574
Rock and Cantaloupe (1)	15	77	1.00	77	5	100	77	7	35
Cucumbers (1)	151	19,184	1.00	19,184	127	90	17,265	7	889
French & runner beans – (1)	3	72	1.03	74	24	10	7	2	48
Green peas in pod (1)	3	11	1.00	11	4	10	1	2	8
Chillies (1)	4	19	1.61	31	5	100	31	2	10
Tomatoes (1,9)	150	15,000	1.00	15,000	100	50	7,500	2	200
Vegetable seed crops									
Chinese cabbage seed (3)	0.7	7	11.00	77	10	100	77	5	50
Radish seed (3)	0.7	7	11.00	77	10	100	77	5	50
Horticulture Total		269,968		292,505	17,868		201,301		74,279
Broadacre crops									

	Yield '000 kg/ha	Production '000 kg	\$/kg	Value \$ '000	Total ha (10)	Reliance on Pollination % (7)	Potential Impact \$ '000	Hives/h a	Theoretical no. of hives required
Small seed crops									
Lucerne seed	0.5	5,000	4.50	22,500	11,000	90 (8)	20,250	2	22,000
Balansa clover									
White clover									
Strawberry clover									
Oil seed crops									
Canola (4) (10 yr average)	1.2	207,000	0.61	126,270	166,500	15 (5)	18,940	1	166,500
Pulses (1)									
Lupins (4) (10 yr averages)	1.3	89000	0.24	21,360	69,450	10	2,136	1	69,450
Faba beans (4) (10 yr averages)	1.7	128,700	0.37	47,619	74,200	25 (6)	18,550	1	74,200
Broadacre Total		429,700		217,749	321,150		59,876		332,150
Pastures									
pollinated pasture species									
Pastures Total									
Total		699,668		510,254	339,018		261,177		406,429

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2. SA Citrus Industry Development Board www.citrus.org.au
3. South Pacific Seeds, Mount Gambier, (Steven Dukalskis Pers. Comm)
4. PIRSA Crop and Pasture Report June 2003 and June 2008.
5. Rob Manning WA Dept Ag. <http://www.seedquest.com/News/releases/2006/march/15056.htm>
6. NSW Agriculture Agnote DAI-128: Honeybees in faba bean pollination, revised 2002.
7. Gordon and Davis (2003) accessed at <http://www.rirdc.gov.au/reports/HBE/03-077.pdf>
8. NSW Agriculture Agnote DAI-134: Lucerne pollination, revised 2002
9. PIRSA Horticulture Crop Information www.pir.sa.gov.au/horticulture
10. Hectares are estimated from ABS yield and tree numbers, or industry information where available
11. Australian Almond Statistics Report 2007 can be downloaded from the ABA website: www.australianalmonds.com.au
12. SA Murray Resource Information Centre (PIRSA Aerial Survey 2008)

Table 2 Monthly Distribution of Hive Requirement

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Theoretical no. of hives required
Horticulture Crops													
Nuts													
Almonds				38,633	38,633								38,633
Pome fruits													
Apples							4,585	4,585					4,585
Pears							290						290
Stone fruits													
Avocados					960	960	960						960
Apricots				2,598	2,598	2,598							2,598
Cherries						2,355	2,355						2,355
Nectarines				483	483	483							483
Peaches				1,299	1,299	1,299							1,299
Plums and prunes				858	858	858							858
Citrus fruits													
Citrus fruit						15,536	15,536						15,536
Berry crops													
Strawberries						258	258	258	258	258	258		258
Blueberry						30							30
Vegetable crops													
Asparagus					1	1							1
Marrows and squashes									1,393	1,393	1,393		1,393
Pumpkin									3,136	3,136	3,136		3,136
Water melon							574	574	574	574	574		574
Rock and Cantaloupe							35	35	35	35	35		35
Cucumbers							889	889	889	889	889		889
French & runner beans					48	48	48	48					48
Green peas in pod					8	8	8	8					8
Chillies					10	10	10						10
Tomatoes							200	200	200	200	200		200
Vegetable seed crops													
Chinese cabbage seed									50	50			50
Radish seed									50	50			50
Horticulture Total	0	0	0	43,871	44,898	24,444	25,748	6,597	6,585	6,585	6,485	0	74,279

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Theoretical no. of hives required
Broadacre crops													
Small seed crops													
Lucerne seed									22,000	22,000	22,000		22,000
Balansa clover													
White clover													
Strawberry clover													
Oil seed crops													
Canola (1)					83,250	83,250	83,250	83,250					166,500
Pulses													
Lupins (1)					34,725	34,725							69,450
Faba beans (1)					37,100	37,100							74,200
Broadacre Total	0	0	0	0	155,075	155,075	83,250	83,250	22,000	22,000	22,000	0	332,150
Pastures													
pollinated pasture species													
Pastures Total													
Total Monthly Hive Requirement	0	0	0	43,871	199,973	179,519	108,998	89,847	28,585	28,585	28,485	0	406,429
Notes Although flowering for many crops is shown over a three month period, actual flowering may be for only part of a month. 1 As flowering varies from early to late districts, hives can be moved to follow flowering													

References and further reading

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