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Gray, Alison and Peterson, M. and Teale, A. (2008) *Varroa and losses of bee colonies in Scotland*. Bee Craft. ISSN 0005-7703

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Gray, Alison and Peterson, M. and Teale, A. (2008) Varroa and losses of bee colonies in Scotland. Bee Craft . ISSN 0005-77031

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# Varroa and Losses of Bee Colonies in Scotland

Alison Gray, Magnus Peterson and Alan Teale

*A survey in Scotland indicates that Varroa is probably a factor in unexplained colony collapse*

**THE APRIL and May 2007 editions of *Bee Craft* have carried articles on Colony Collapse Disorder (CCD) in the USA and elsewhere. Equally, there has been considerable recent press interest in CCD and its possible causes, amid speculation as to whether CCD is now appearing in the UK**

In relation to Scotland, some interesting findings on unexplained colony losses and a possible link to Varroa infestation of bee colonies arise from a survey of members of the Scottish Beekeepers' Association (SBA) carried out in May 2006. This survey covered the period April 2004 to March 2006 and was undertaken largely as a response to reports of apparently newly emerging problems with queen rearing in parts of southern England and concern over the effects of the arrival of *Varroa destructor* in Scotland in 1996 and its subsequent wide spread across the country.

## ALL PARTS OF SCOTLAND

The survey was stratified across the four SBA Areas, namely Aberdeen, East, North, and West. In all, 100 members were approached, 30 from each of the North, East and West areas and 10 from the Aberdeen area, to give each area an appropriate weight according to its size and so that about 10% of the total SBA membership was invited to participate.

The members were selected personally by the Local Association Secretaries or Area Representatives rather than randomly. This method of selection is unlikely to give a truly representative sample but was the only method feasible without the consent of SBA members to use Association records of their contact details. What it did provide was an exceptionally high response rate of 77%. Participants completed a questionnaire on a variety of topics relating to beekeeping practice and experience.

The typical respondent to this survey is a small-scale beekeeper, with the typical number of stocks kept by respondents being eight or less for the period surveyed. However, some larger enterprises were also included, the largest one keeping 325 stocks in 20 apiaries in the West of Scotland area.

## RESULTS

A short summary of overall findings from initial analysis of the data appeared in the December 2006 issue of *The Scottish Beekeeper*, and the full report of the analysis is available on the SBA website at



Some beekeepers reported finding colonies that went into winter in good shape were small and weak in spring

[www.scottishbeekeepers.org.uk](http://www.scottishbeekeepers.org.uk). Some findings relevant to the impact of varroa and the incidence of unexplained colony losses are as follows.

## Varroa

The question on the year in which each respondent first found varroa revealed that the mite is still not present throughout Scotland. All respondents in the East area had found it and most had seen it for at least two years. Only two in the West had not yet found it, but in the Aberdeen and North areas it was significantly less widespread. In fact no one in the North had seen it before 2004 and more than half the respondents in that area had not yet found it.

## Swarming

Participants were asked about swarming, as it was thought that this could well be affected by varroa. Numbers of swarms observed and taken per season were generally low (typically one) though, as would be expected, some respondents on lists of beekeepers held by Local Councils or Police dealt with many more (up to 16).

Slightly over 50% of respondents used bait hives to try to attract swarms in both 2004 and 2005, the practice being more common in the Aberdeen and North areas. Of those using this technique, 58% were successful in attracting swarms in 2004 and 62% in 2005. Success in attracting swarms may prove a useful measure in future of the impact of varroa in reducing the number of feral honey bee colonies and hence of the number of stray swarms.

## Unexplained losses

Regarding unexplained losses of colonies, there was an overall rate of loss per colony kept of just under 5% amongst respondents for winter 2004/05, about 2% during summer 2005 and about 7.5% over winter 2005/06. Small-scale beekeepers appeared to experience proportionately higher loss rates than large-scale beekeepers.

## Sudden collapse

The sudden collapse of apparently thriving colonies with hives unexpectedly found abandoned was also investigated (referred to in the SBA article and survey report as the 'Marie Celeste' phenomenon, rather than Colony Collapse Disorder). About 45% of reported losses were of this type over winter 2004/05, about 81% over summer 2005 and about 42% over winter 2005/06.

Most interestingly, a highly statistically significant link was found between the odds of a respondent reporting this phenomenon occurring at all and the longer the period of time that varroa was known to be established in the respondent's bees. This provides conclusive scientific evidence of varroa infestation, directly or indirectly, being a contributory factor in the risk of CCD. This may, for example, be associated with activation of associated virus infections. (The statistical analysis estimated that the odds of CCD occurring increased by a factor of about 1.5 for every year of known infestation with varroa.)

## Inbreeding

An attempt was made to estimate the risks of inbreeding among respondents' bees, on the assumption that soon varroa will kill off all feral honey-bee colonies, apart from re-colonisation of old sites by escaped swarms from beekeepers. Large apiaries with many related queens were supposed to be at particular risk but due to poor response to questions on these topics it is hard to draw firm conclusions.

## Queen rearing

An attempt was also made to assess the number of attempts at queen rearing and mating which were made and the proportion of these that was successful. Large-scale beekeepers made many more attempts and were in general more successful. The success rate was generally over 80%. There was some suggestion that 2005 was a more difficult year than 2006, though the difference was not statistically significant.

Respondents were invited to report any unusual numbers of supersedures or any deformities among queens being



Varroa and associated viruses seem to be implicated in unexplained colony deaths in Scotland

reared, as well as unusual behaviour of the bees. High numbers of supersedures were reported only by 3 (4%) and queen deformities by 5 (6%). However, unusual behaviour was reported by 23 (30%), who provided useful comments which are all included in an Appendix to the full report.

One of the respondents, who actually witnessed the collapse of a hive, described this in detail and also mentions both previously treating for varroa and possible stress from the uniting of colonies. The description is as follows:

*'On a warm sunny day in March 2005 almost all the bees crawled out of hive, into the grass and up plant stems. They were normal size and shape but had uncoupled wings and were trembling. These are text book symptoms of chronic (slow?) paralysis virus. The queen and about 100 bees were left in the hive. All were dead in a few days. There was no brood present but there were sufficient stores and the combs were clean. The bees in the grass all died and all traces were gone in a few days. There was very little activity for a few days before. Varroa was first seen in summer 2004 and treated in September. Perhaps stress was a factor as uniting of colonies was rather clumsily handled.'*

## Queenless in spring

Another interesting comment relates to colonies emerging queenless in spring:

*'As a beekeeper for many years, I have observed an increase in the number of colonies emerging queenless in spring over the past three years. The number of colonies surviving winter but appearing in a weakened state has also increased over this period of time. In every case the colonies went into winter in good shape and had an abundance of stores in spring'. ☘*

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