

Bee Surveillance Programmes, Bee Mortality and Risk Assessment

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European Food Safety Authority



- EFSA is the European agency responsible for risk assessment in the area of food and feed safety.
- Works in close collaboration with national authorities and in open consultation with its stakeholders







EFSA's tasks

- 1. Provide scientific advice, opinions, information, and technical support for Community legislation and policies
- 2. Collect and analyse data for characterisation and monitoring of risks
- 3. Promote and coordinate development of uniform risk assessment methodologies
- 4. **Communicate risks** related to all aspects of EFSA's mandate

Risk Assessment Guidance



- Preparation of Guidance Documents
 - Terrestrial Ecotoxicology Revision of SANCO/10329/2002 - Plant protection products and their residues panel (PPR)
 - Environmental Risk Assessment Non target organisms - Genetically modified organisms panel (GMO)
 - To include tiered risk assessment approach for bees



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- Request from "Mortality, collapse and weakening in bee hives" working group of AFSSA
- Short questionnaire distributed through the EFSA focal point network
- Requested data on:
 - monitoring programmes for chemical residues in honey
 - surveillance programmes for weakening, colony collapse and mortality
 - mortality rates 2006-2007
 - bee populations, bee keepers and honey production 2006-2007

Agence Francaise de Securite Sanitaire des Aliments (AFSSA)

Distribution of bee populations in Europe



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European pollinators > 10 million colonies



Mortality rates 2006-2007



Country	2006	2007
	Mortality rate (%)	Mortality rate (%)
Czech Republic	10	20
Denmark	15	7
Estonia	8-10	8-10
Finland	9.3	10.2
France	808*	142*
Germany	13	9
Italy	30-40	40-50
Luxembourg	16	20
Netherlands	26	15
Norway	10.6	
Romania	10	>20
Spain	6-40	6-40
Sweden	18	12
United Kingdom	11.1	11.7

* Mortality data expressed as number of statements

Article 36 Project - Objectives



- WP1: description and critical analysis of surveillance programmes; recommendations for the improvement and harmonisation at the European level;
- WP2: collection and analysis of the epidemiological dataset on colony collapse, weakening and mortality, stemming from the existing surveillance programmes;
- WP3: critical review and selection of relevant literature on the possible causes of honey bee colony collapse, weakening and mortality.
- The global objective of the project is to facilitate future epidemiological research and surveillance programmes at EU level addressing the phenomenon of honey bee colony losses.

Surveillance Networks Analysed





Conclusion: General weakness of most of the surveillance systems in the 24 countries investigated

Syndromes and Diseases Under Surveillance

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Class	Disease/ Syndrome	Under surveillance	Absent	No information	Present
Colony losses	Colony losses	23			23
Bacteria	AFB	19	1	1	22
	EFB	17	6		18
Acarian	Varroasis	20		1	23
	Acarapisosis	13	12	1	9
	Tropilaelaps	11	23		0
Other parasites	Small hive beetle	12	23		0
	Exotic hornet	1	1		0
Fungi	Stonebrood	1	1		0
	Chalkbrood	4			4
Protozoan	Nosemosis	12			13
	Amebiasis	1			1
Poisoning	Bee poisoning incident	5			8
	Pyrethroid resistance	1			1
	Acaricide poisoning	1			1
	GMO	0	4		0
Viruses	Virus infection	2			4
	SBV	6			6
	ABPV	5			5
	CBPV	5	1		4
	BQCV	4	1		3
	IABPV	3	3		1
	KBV	3	1		3
	DWV	3			3

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Integration with Veterinary and Laboratory Services



• Field agents

- 44% (11 systems) are using trained beekeepers to detect and notify of colony loss events
- 80% (20 systems) field veterinarians are not used as field agents for surveillance of bee diseases
- Laboratory services
 - 36% (9 systems) have no laboratory facilities to support them

Winter colony loss rate





Conclusion: Lack of representative data at country level and comparable data at EU level for colony losses 12



Conclusion: Consensus of the scientific community about the multifactorial origin of colony losses in Europe and in the United States and insufficient knowledge of causative and risk factors for colony losses.¹³

Case Definitions



60 Papers reviewed – 20 definitions for CCD

(i) sudden loss of the colony's adult bee population with very few bees found near the dead colonies; (ii) several frames with healthy, capped brood with low levels of parasitic mites, indicating that colonies were relatively strong shortly before the loss of adult bees and that the losses cannot be attributed to a recent infestation of mites;

(iii) food reserves that have not been robbed, despite active colonies in the same area, suggesting avoidance of the dead colony by other bees;

(iv) minimal evidence of wax moth or small hive beetle damage; and

(v) a laying queen often present with a small cluster of newly emerged attendants

The rapid and seemingly spontaneous loss, disappearance, and demise of honey bee colonies

A disorder in which disturbing numbers of bees are disappearing from their colonies

Suddenly empty hives, no dead bees inside or around the hive, no bees in the hive, evidence of recent brood (queen and young larvae are left behind), absence of pests (no wax moths or hive beetle, nothing trying to rob the honey). Colony leaves behind brood, honey, pollen & all resources.

It is characterized by: a rapid loss of adult bees, excess brood in all stages (abandoned in the hive), low level of Varroa, a lack of dead bees in or near the hive

A mysterious malady depopulating beehives around the globe

Biological factors identified from literature



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Authors' opinion on the biological agent factors involvement in colony losses



Class of factor					
	Unlikely ¹	Probable ²	Very likely ³	Proven ⁴	Total
Acarapis woodi	1	1	1	1	4
Africanized bees					0
American foulbrood		1		1	2
Ascosphaera apis					0
European foulbrood		1			1
Hivebeetle					0
Malpighamoeba					0
Multiple infections	1	5	5		11
Nosema	4	5		1	10
Unidentified disease	1	8	2		11
Varroa	2	10	6	1	19
Virus	7	12	1		20
WaxMoth					0

¹ The author reports that he is considering this factor is not involved in colony losses.

² The author reports that he is considering this factor is possibly involved in colony losses. ³ The author reports that he is considering this factor is certainly involved in colony losses but he gives no proof for it.

⁴ The author gives a proof of the involvement of this factor in colony losses.

Recommendations



- Establishment of a sustainable European network for coordination and follow-up of surveillance on colony losses to underpin monitoring programmes;
- Strengthen standardization at European level by harmonization of surveillance systems, data collected and by developing common performance indicators.
- Build on the examples of best practice found in existing surveillance systems for communicable and notifiable diseases already present in some countries;.
- Undertake specific studies that build on the existing work in progress to improve the knowledge and understanding of factors that affect bee health (for example stress caused by pathogens, pesticides, environmental and technological factors and their interactions) using appropriate epidemiological studies (case control and longitudinal studies).
- The set up of the coordination team at European level. This is a crucial issue and the coordination team should be organized in such a way so as to ensure its sustainability and to enable effective surveillance programme activities at the European level.

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