SUMMARY OF THE CONCLUSIONS FROM THE EFSA TECHNICAL REPORT ON BEE BACKGROUND MORTALITY; REVIEW OF USEFULNESS AND UNCERTAINTIES.

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Introduction

The EFSA 2013[1] Guidance Document on the Risk assessment of Plant Protection Products on Bees has not been fully implemented, with some Member States requesting a review of the document. The European Commission mandated EFSA to review the GD. This included a review of **bee background mortality**, considering realistic bee keeping management and natural mortality rates.

The outcome of this request is the EFSA Technical Report: Review of the evidence on bee background mortality (2020)[2].

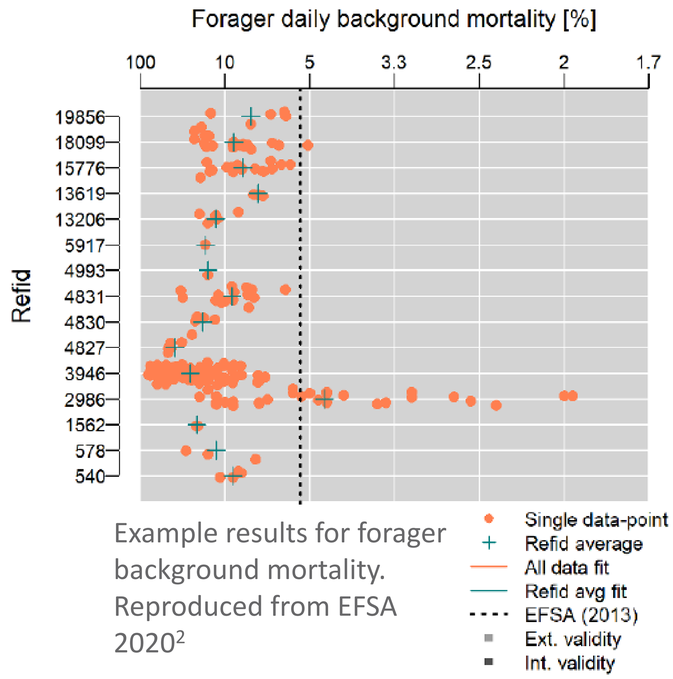
The mortality values may feed into a revision of EFSA 2013 and therefore impact future risk assessments for bees.

Background mortality rate → RA Trigger Values → HQ/ETR must be ≤ Trigger Value to demonstrate safe use

Trigger values used in EFSA 2013[1] were calculated using mortality rates found in literature for forager bees (7 studies on honeybees, 4 for bumblebees, and 1 for solitary bees)

Daily mortality values used in EFSA 2013[1] for trigger value calculation:

- **5.3% = honeybee**
- **4.4% = bumble bees**
- **5% *Osmia* (solitary)**
- **Lowest value overall used due to limited data set.**



Example results for forager background mortality. Reproduced from EFSA 2020[2]

Methods and results

The EFSA review posed 8 questions intended to estimate daily background mortality within the EU.

A systematic literature review was performed to answer the first 7 questions, and a survey was sent to EU beekeepers to answer the 8th question; 122 citations included (from ~11 000 original literature hits).

1. Adult honeybee mortality during the active period

Foragers: Daily average mortality = 12.6%. Some as low as 2%. Overall adult workers: ~3.7%. Seasonal data showed increasing mortality from May → Sept. Drone data limited, followed seasonal trends. Ranged 1.9-20%.

2. Adult honeybee morality during the inactive period

Daily mortality rate for over-wintering honeybees = 0.4%. Increased wintering period correlated with reduced survival rate.

3. Adult bumblebee mortality during the active period

Only queens over winter, so mortality rate not constant over the year. Average daily rate = 2% for *B. terrestris,* 6% for all other *Bombus*.

4. Adult queen bumblebee mortality during the active period

Nests abandoned before workers produced used as a proxy for queen mortality: 27 and 35%, but daily rates couldn't be calculated.

5. Adult queen bumblebee mortality during the inactive period

Only 1 suitable reference. 44.7% overwintering success reported. No daily rates calculated.

6. Solitary bee mortality during the active period

Focus = population level due to lack of colonies. Data didn't support a constant daily mortality rate, but this was still assumed to derive mean representative values. Daily mortality rate ranged 1.2 – 14.3% within and across species.

7. Adult solitary bee mortality during the winter

3 citations used. Overwintering mortalities ranged 13.6-53%. No daily rates calculated.

8. Impact of specific beekeeping practices on adult honeybees

From literature: Isolated incidences of bee treatments increasing rate of mortality, but mortalities mostly within background predicted rates. Results not directly comparable to daily mortality rates. From survey: Low impact of most practices but smoking of bees had a particularly high impact on mortality.

Impact on risk assessment

- Impact on RA depends on how EFSA 2020 is used – how to select mortality values? Average or Percentile?
- If lower background mortality values were concluded, this would result in more conservative trigger values.
- More data for honeybees than EFSA 2013, but data for bumble/solitary bees still limited. Further research required?
- Mortality rates were not consistent across the season – RA needs to be seasonal?
- Data shows wide-ranging mortality rates across studies, between honeybee groups (e.g., forager Vs. all workers) and between species. No consideration of larvae.
- How do values relate to colony/population strength? Is daily mortality rate a suitable measure of colony strength? Suitable to use the same approach for different species/life histories?

References:
1 European Food Safety Authority, 2013. EFSA Guidance Document on the risk assessment of plant protection products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees). EFSA Journal 2013;11(7):3295, 268 pp., doi:10.2903/j.efsa.2013.3295
2 EFSA (European Food Safety Authority), Ippolito A, del Aguila M, Aiassa E, Muñoz Guajardo I, Neri FM, Alvarez F, Mosbach-Schulz O, Szentes C, 2020. Review of the evidence on bee background mortality. EFSA supporting publication 2020:EN-1880. 76 pp. doi:10.2903/sp.efsa.2020.EN-1880