

Higher tier testing for non-Apis bees: Current state of play

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INTRODUCTION

The recently published European Food Safety Authority (EFSA) guidance document on risk assessment of plant protection products on pollinators had a significant impact on current procedures for not only risk assessors, but also testing laboratories in charge of conducting the requested and often uncertain higher tier studies. Especially for non-Apis bees, such as bumble bees and solitary bees, there is still considerable uncertainty: either regarding extrapolating from honey bees that are routinely tested but still exhibit largely different life-cycle habits, or facing the challenge to conduct newly requested laboratory or higher tier studies in a GLP-compliant manner despite the general lack of standardisation and validation. Aside the theoretical approach of modelling the effects for non-Apis bees based on actual effects on honey bees, the setup of standardized and validated methods for higher tier non-Apis studies is of great value and will gain even more importance in the near future. Furthermore, the aspect of gathering realistic exposure residue analysis data in higher tier terrestrial studies increases in importance as well.

POINTS OF INTEREST

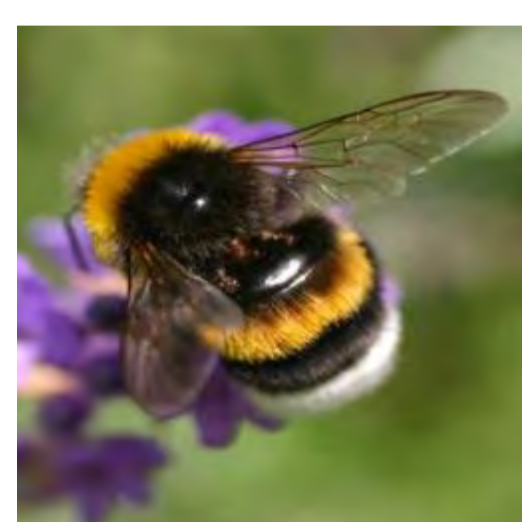
Referring to the EFSA guidance document, higher tier testing for non-Apis bees may be required for risk assessment of PPPs.

Bumble bees and Solitary bees are ecologically important 'wild' pollinators, scientifically well-investigated, commercially available, and relatively easy to handle.

Plenty of specific literature available, yet methodological compromises need to be found for prioritising individual endpoints and allow routine implementation of higher tier testing (particularly in the field).

How much can general study designs be simplified without missing most relevant endpoints?

TIERED APPROACH



Bumble bee *Bombus ssp.*

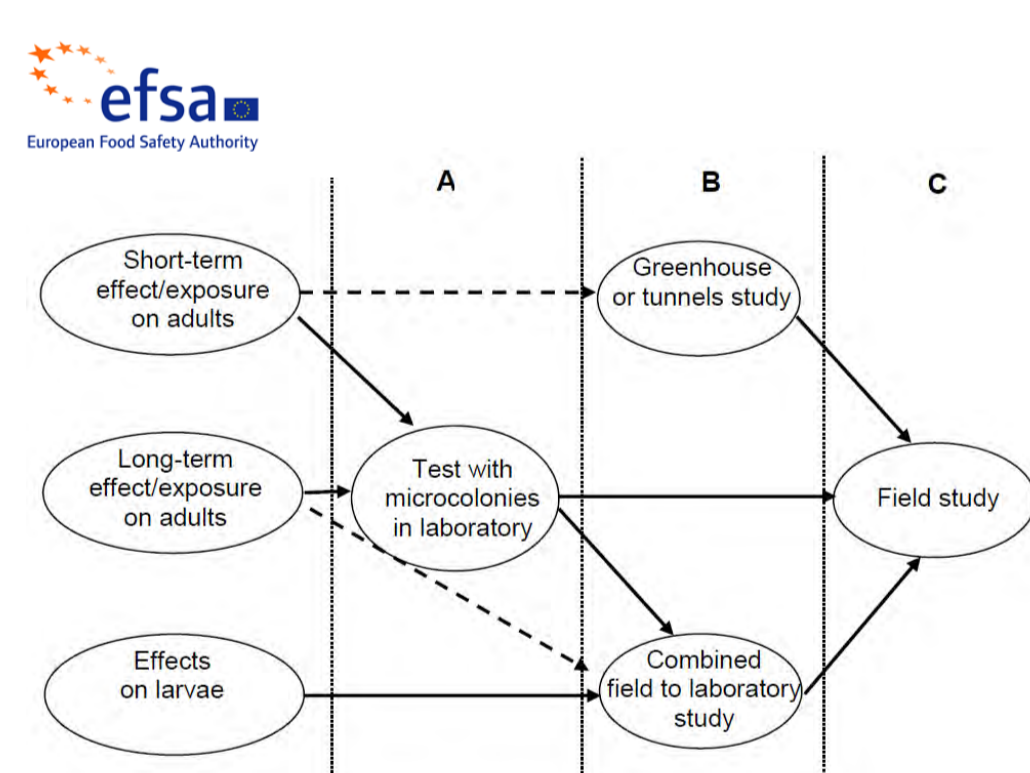
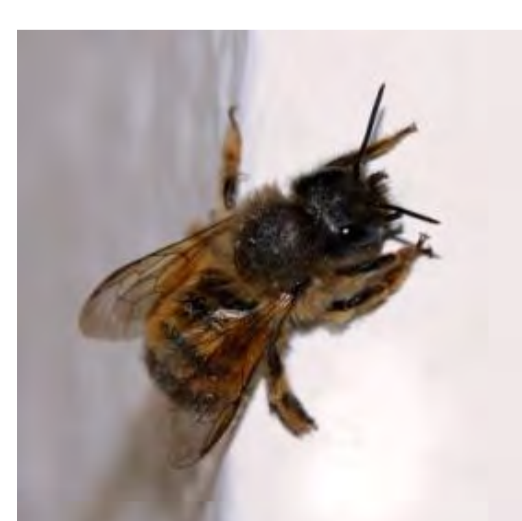
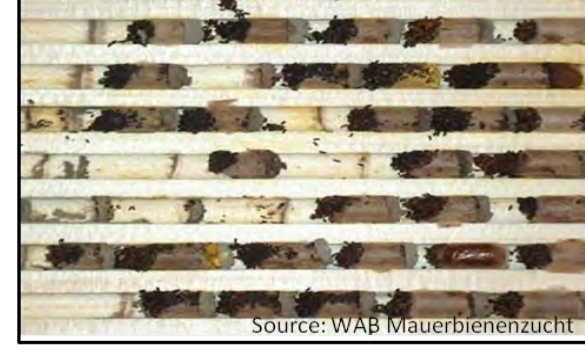
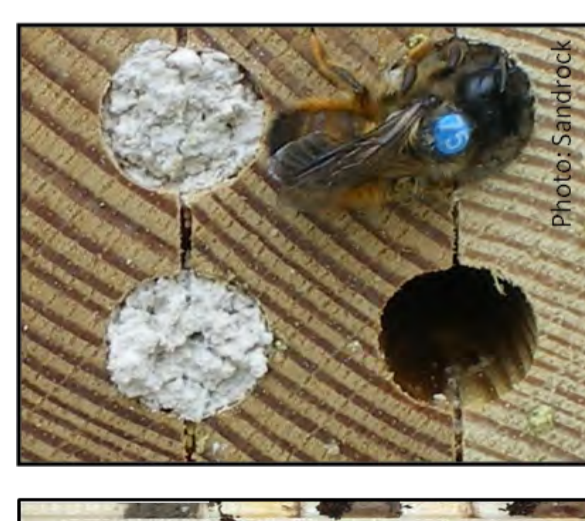
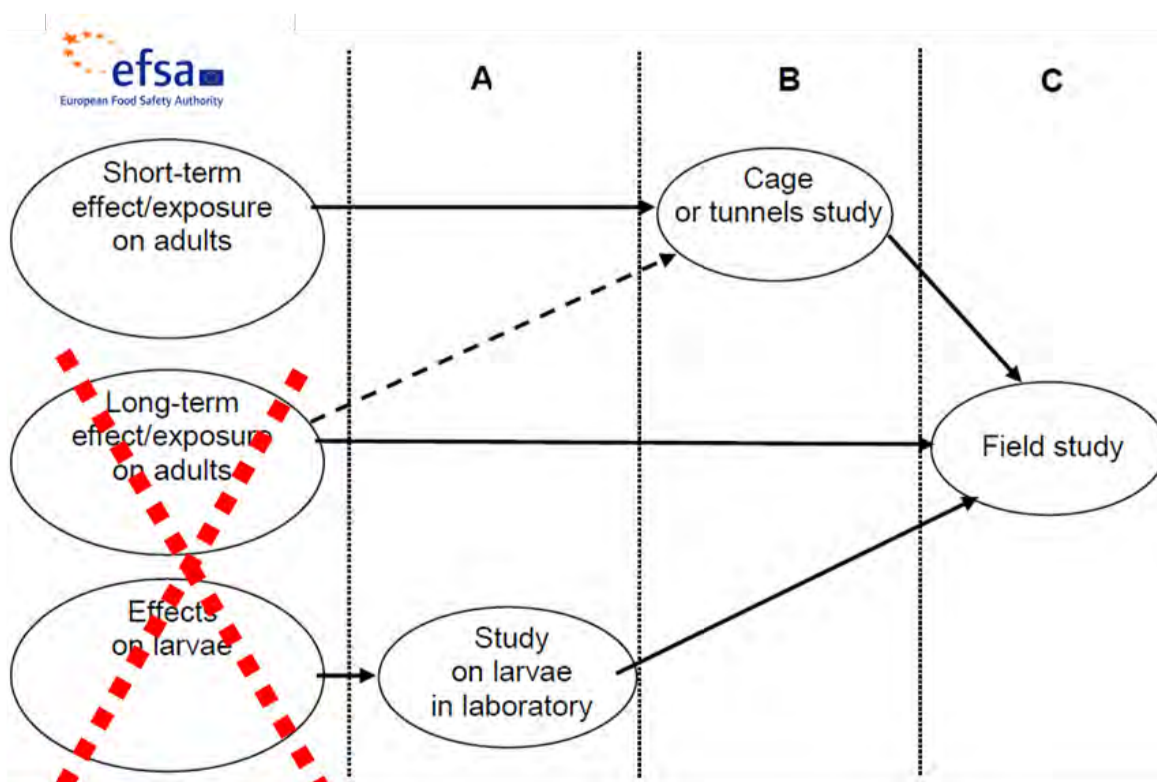


Figure 14: Schematic overview proposed for bumble bees of the different higher tier tests for the different concerns highlighted in the first tier studies. If there is more than one concern, the applicant should carry out the most comprehensive study, i.e. the study should be designed to address all the concerns raised at lower tiers. The level of realism of the test increases from A to C. The bottom line indicates an optional way.



Solitary bee *Osmia cornuta* / *Osmia bicornis*

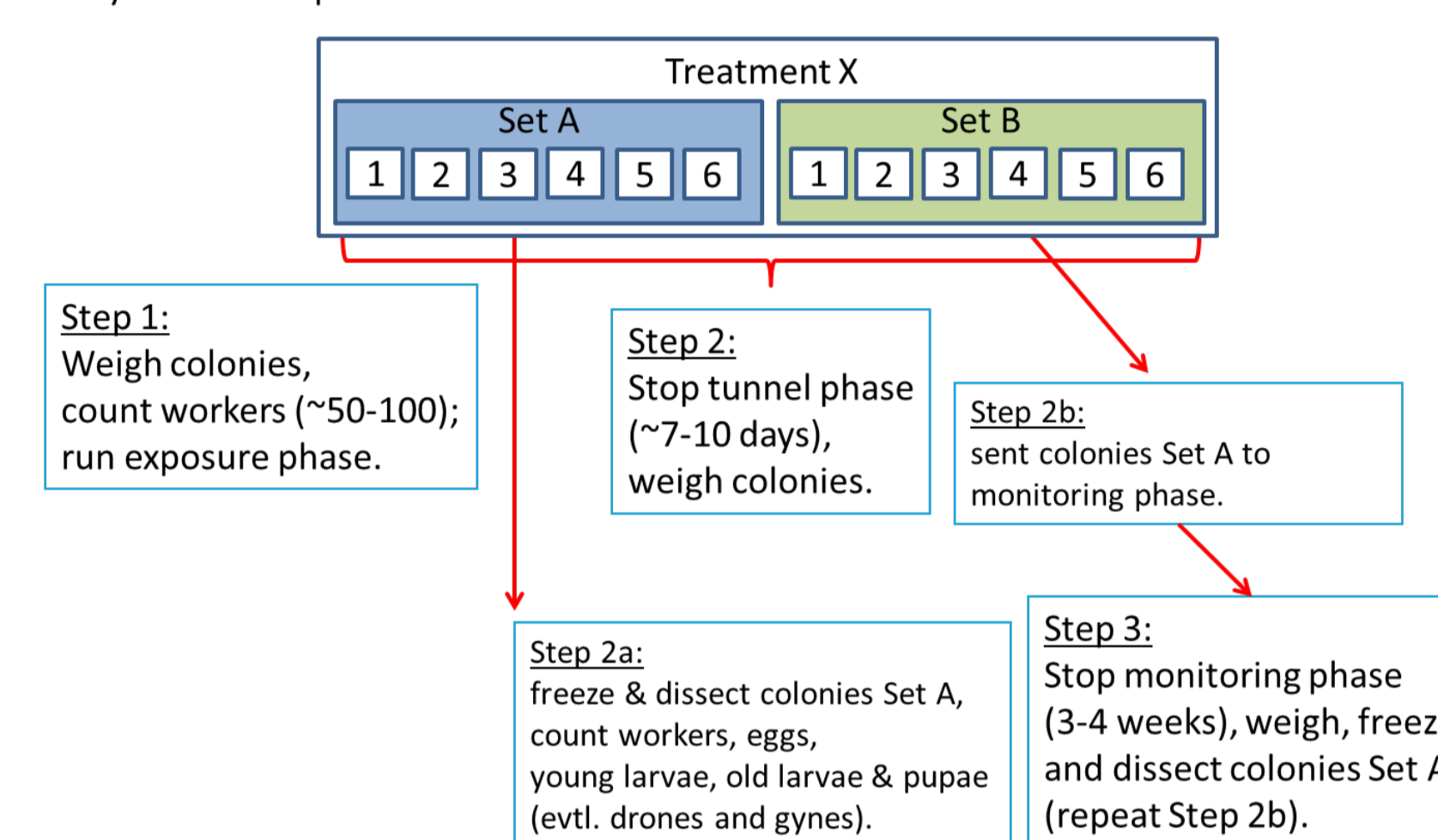


Please also refer to Poster "First results of a method proposal for a Bumble bee (*Bombus* spp.) first tier acute contact and oral laboratory test" by the bumble bee ringtest group.

METHODOLOGY

Bumblebee higher tier studies

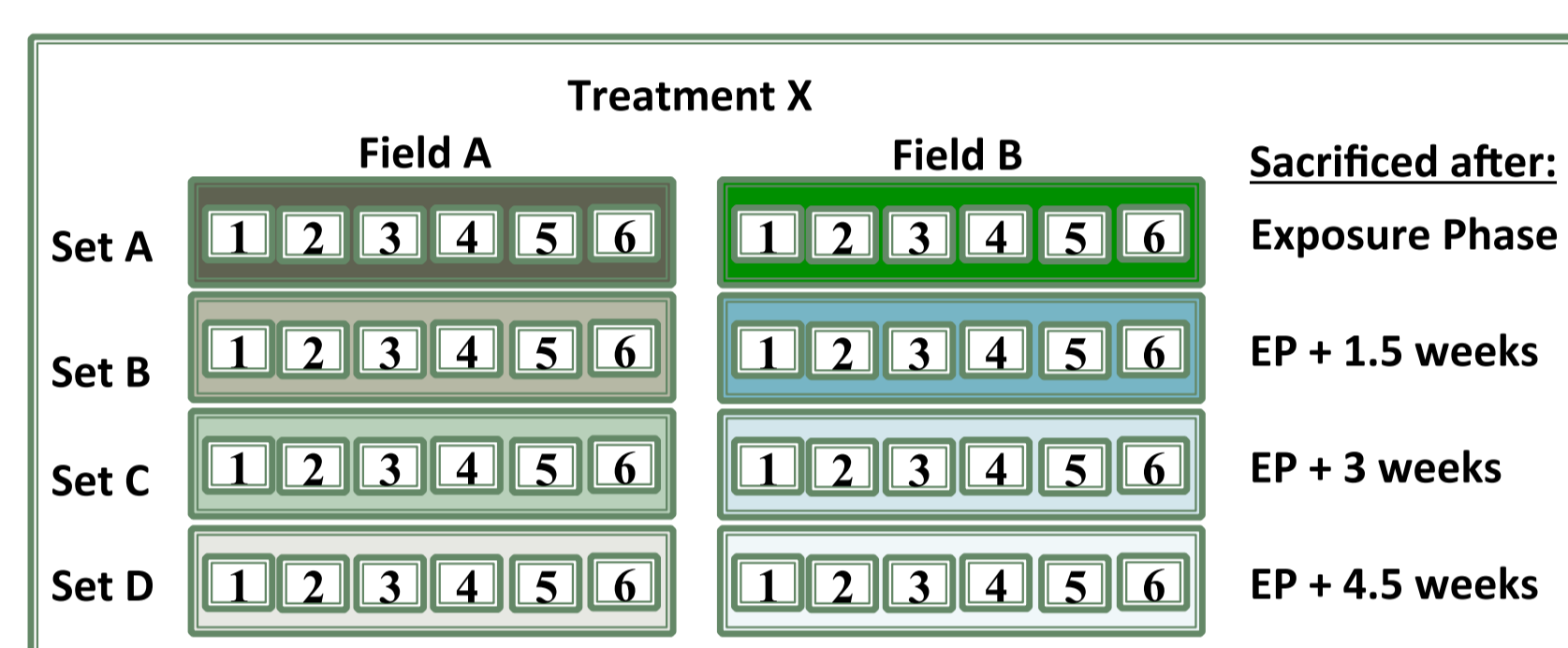
Colony subset setup for tunnel studies:



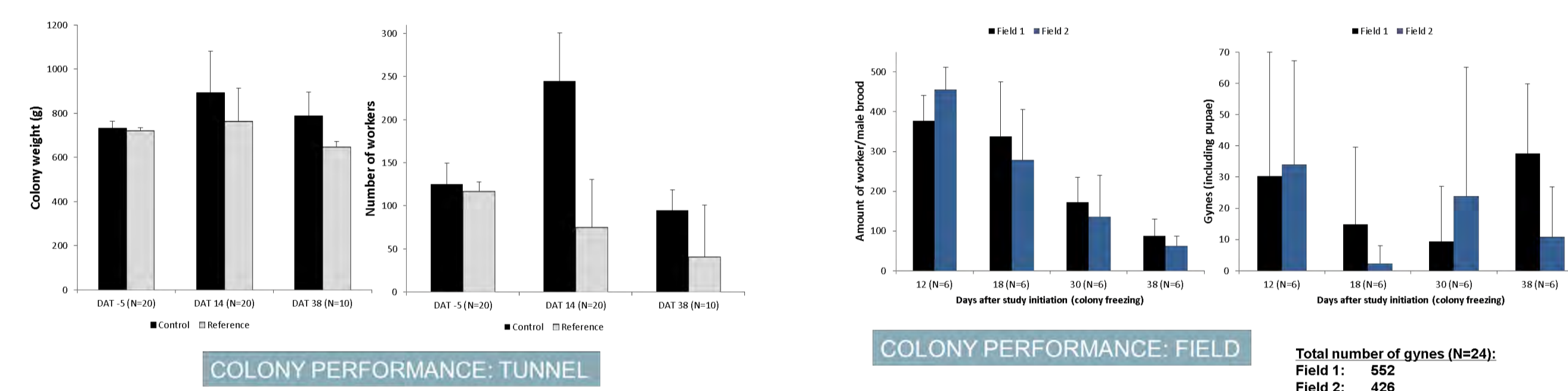
- Endpoints
- foraging activity
- food stores
- Mortality
- brood production (colony strength)

- ≥ 20 colonies for each treatment
- 1 colony per tunnel (no compartments)
- 60-90 m2 tunnels (tightened thoroughly)
- ~3 days of conditioning, up to 3 weeks tunnel phase

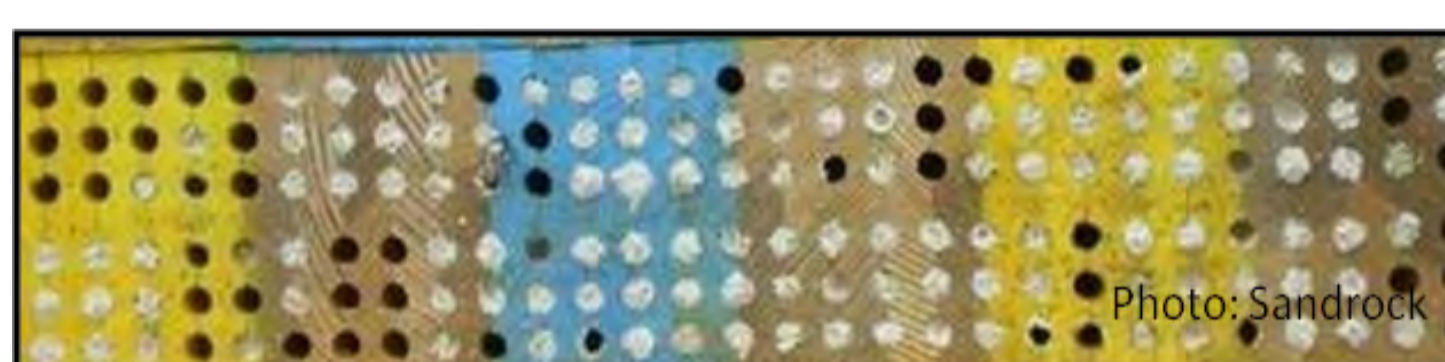
- Colonies remain at monitoring site until sexuals are produced
- Freezing of 2 batches (≥ 10 colonies each) during/after tunnel phase and during production of sexuals (don't miss it!)



Solitary bees higher tier studies



Semi-field tunnel versus indoor cage



Method:

- tunnels (oil seed rape)
- nesting holes
- 30-50 newly emerged bees of both sexes
- sufficient tunnel replicates/treatment
- progeny maintaining

Assessments:

- nesting behavior, foraging activity & cell production rate
- Total brood cell production (proxy of adult mortality and sublethal effects combined)
- offspring emergence/mortality, body weights & sex ratios

CONCLUSIONS

Bumblebee higher tier studies should not be performed too late in the season! Using strong colonies has advantages but may also limit inferences! Comparatively high replication levels are needed in general! Field trials essentially need to be replicated across fields! 4 batches may not be needed, but 2-3 are recommended! Given the (more) complex design / data, appropriate statistics / models are crucial!

We are not there yet! More data and then ring-testing needed! Keep additional options open, e.g. adapting the 'Oomen-approach' to whole bumble bee colony laboratory studies (under redlight) based on realistic/worst-case exposure scenarios.