

Supplementary information

Table S.1 Details of calculation of TUm values. Total ppb converted to acute dose ($\mu\text{g}/\text{bee}$) considering a maximum consumption rate of 12 mg bb/bee/d (beebread matrix). Surrogate LD50m ($\mu\text{g}/\text{bee}$) calculated by using $(\Sigma \text{pi} / \text{LD50i}) - 1$. Ln(TUm: natural logarithm of the toxic unit of the mixture

		Residues						Toxicity (µg/bee)			Toxic Unit of the mixture (TUm)	
Matrix	n	Coumaphos (CMF)		Tau-fluvalinate (FVT)		total ppb	surrogated dose µg/bee	LD50	LD50 tau	surrogate	TUm	Ln(TUm)
		ppb	proportion	ppb	proportion			coumafos	fluvalinate	LD50m		
Dead colonies												
D1	2	4.35 10 ⁺⁰²	9.84 10 ⁻⁰¹	7.00	1.58 10 ⁻⁰²	4.42 10 ⁺⁰²	5.30 10 ⁻⁰³			3.14	1.69 10 ⁻⁰³	-6.38
D2	2	4.15 10 ⁺⁰²	9.8310 ⁻⁰¹	7.00	1.66 10 ⁻⁰²	4.22 10 ⁺⁰²	5.06 10 ⁻⁰³			3.14	1.61 10 ⁻⁰³	-6.43
D3	1	2.02 10 ⁺⁰²	1	<LOQ	0	2.02 10 ⁺⁰²	2.42 10 ⁻⁰³			3.10	7.82 10 ⁻⁰⁴	-7.15
D4	2	3.50 10 ⁺⁰²	9.64 10 ⁻⁰¹	1.30 10 ⁺⁰¹	3.58 10 ⁻⁰²	3.63 10 ⁺⁰²	4.36 10 ⁻⁰³	3.10	1.22 10 ⁺⁰¹	3.19	1.37 10 ⁻⁰³	-6.59
D5	2	3.23 10 ⁺⁰²	9.73 10 ⁻⁰¹	9.00	2.71 10 ⁻⁰²	3.32 10 ⁺⁰²	3.98 10 ⁻⁰³			3.16	1.26 10 ⁻⁰³	-6.61
mean		3.45 10 ⁺⁰²	9.81 10 ⁻⁰¹	7.20	1.91 10 ⁻⁰²	3.52 10 ⁺⁰²	4.23 10 ⁻⁰³			3.14	1.34 10 ⁻⁰³	
d.s		9.21 10 ⁺⁰¹	1.35 10 ⁻⁰²	4.71	1.35 10 ⁻⁰²	9.49 10 ⁺⁰¹	1.14 10 ⁻⁰³			3.20 10 ⁻⁰²	3.59 10 ⁻⁰⁴	
Survival colonies												
S1	2	2.83 10 ⁺⁰²	9.76 10 ⁻⁰¹	7.00	2.41 10 ⁻⁰²	2.90 10 ⁺⁰²	3.48 10 ⁻⁰³			3.16	1.10 10 ⁻⁰³	-6.81
S2	2	5.45 10 ⁺⁰²	9.84 10 ⁻⁰¹	9.00	1.62 10 ⁻⁰²	5.54 10 ⁺⁰²	6.65 10 ⁻⁰³			3.14	2.12 10 ⁻⁰³	-6.16
S3	2	2.23 10 ⁺⁰³	9.96 10 ⁻⁰¹	1.00 10 ⁺⁰¹	4.46 10 ⁻⁰³	2.24 10 ⁺⁰³	2.69 10 ⁻⁰²			3.11	8.64 10 ⁻⁰³	-4.75
S4	2	4.65 10 ⁺⁰²	9.69 10 ⁻⁰¹	1.50 10 ⁺⁰¹	3.13 10 ⁻⁰²	4.80 10 ⁺⁰²	5.76 10 ⁻⁰³			3.17	1.81 10 ⁻⁰³	-6.31
S5	2	1.14 10 ⁺⁰³	9.83 10 ⁻⁰¹	2.00 10 ⁺⁰¹	1.73 10 ⁻⁰²	1.16 10 ⁺⁰³	1.39 10 ⁻⁰²			3.14	4.41 10 ⁻⁰³	-5.42
S6	2	3.05 10 ⁺⁰²	9.50 10 ⁻⁰¹	1.60 10 ⁺⁰¹	4.98 10 ⁻⁰²	3.21 10 ⁺⁰²	3.85 10 ⁻⁰³	3.10	1.22 10 ⁺⁰¹	3.22	1.20 10 ⁻⁰³	-6.73
S7	2	7.75 10 ⁺⁰²	9.77 10 ⁻⁰¹	1.80 10 ⁺⁰¹	2.27 10 ⁻⁰²	7.93 10 ⁺⁰²	9.52 10 ⁻⁰³			3.15	3.02 10 ⁻⁰³	-5.80
S8	2	8.50 10 ⁺⁰²	9.78 10 ⁻⁰¹	1.90 10 ⁺⁰¹	2.19 10 ⁻⁰²	8.69 10 ⁺⁰²	1.04 10 ⁻⁰²			3.15	3.31 10 ⁻⁰³	-5.71
S9	2	9.36 10 ⁺⁰²	9.86 10 ⁻⁰¹	1.30 10 ⁺⁰¹	1.37 10 ⁻⁰²	9.49 10 ⁺⁰²	1.14 10 ⁻⁰²			3.13	3.64 10 ⁻⁰³	-5.62
S10	2	8.45 10 ⁺⁰²	9.85 10 ⁻⁰¹	1.30 10 ⁺⁰¹	1.52 10 ⁻⁰²	8.58 10 ⁺⁰²	1.03 10 ⁻⁰²			3.14	3.28 10 ⁻⁰³	-5.72
mean		8.37 10 ⁺⁰²		1.40 10 ⁺⁰¹		8.51 10 ⁺⁰²	1.02 10 ⁻⁰²			3.15	3.25 10 ⁻⁰³	
d.s		5.63 10 ⁺⁰²		4.40		5.63 10 ⁺⁰²	6.76 10 ⁻⁰³			2.95 10 ⁻⁰²	2.18 10 ⁻⁰³	
Overall mean												
beebread		6.73 10 ⁺⁰²	9.83 10 ⁻⁰¹	1.17 10 ⁺⁰¹	1.71 10 ⁻⁰²	6.85 10 ⁺⁰²	8.22 10 ⁻⁰³	3.10	1.22 10 ⁺⁰¹	3.14	2.62 10 ⁻⁰³	-5.95

Table S.2 Primers used for each pathogen in PCR reactions

	Pathogen	Primer	Sequence	Amplicon size
PCR	N. ceranae	218 CER-F	5'-CGGCGACGATGTGATATGAAAATATTAA-3'	218-219 pb
		218 CER-R	5'-CCCGGTCATTCTCAAACAAAAAACCG-3'	
	N.apis	218 CER-F	5'-GGGGGCATGTCTTTGACGTACTATGTA-3'	321 pb
		218 CER-R	5'-GGGGGGCGTTTAAAATGTGAAACAACACTATG-3'	
	Trypanosomatids	CRI-SEF	5'- CTTTTGGTCGGTGGAGTGAT- 3'	417 pb
		CRI-SER	5'- GGACGTAATCGGCACAGTTT- 3'	
	L.passim	LpCytb_F1	5'-CGAAGTGCACATATATGCTTTAC-3'	247 pb
		LpCytb_R	5'-GCCAAACACCAATAACTGGTACT-3'	
	C. mellificae	CmCytb_F	5'-AGTTTGAGCTGTTGGATTGTGTT-3'	140 pb
		CmCytb_R	5'-AACCTATTACAGGCACAGTTGC-3'	
	Neogregarines	API-NEOF	5'- CCAGCATGGAATAACATGTAAGG- 3'	260 pb
		API-NEOR	5'- GACAGCTTCCAATCTCTAGTCG- 3'	
RT-PCR	A. woodi	AW180-FOR	5'-GGAATATGATCTGGTTTAGTTGGTC-3'	180 pb
		AW180-REV	5'- GAATCAATTTCCAAACCCACCAATC-3'	
	LSV-complex	LSVdeg-F	5'-GCCWCGRYTGTTGGTYCCCCC-3'	600 pb
		LSVdeg-R	5'-GAGGTGGCGGCGCSAGATAAAGT-3'	
	AKI	AKI-F	5'-CTTTCATGATGTGGAAACTCC-3'	100 pb
		AKI-R	5'-AAACTGAATAATACTGTGCGTA-3'	
RT-qPCR	BQCV	BQCV 9195F	5'-GGTGCGGGAGATGATATGGA-3'	305 pb
		BQCV 265r	5'-GCCGTCTGAGATGCATGAATAC-3'	
		BQCV 8217T*	5'-FAM-TTTCATCTTTATCGGTACGCCGCC-TAMRA-3'	
	DWV	DWV 9587F	5'-CCTGGACAAGGTCTCGGTAGAA-3'	250 pb
		DWV 9711R	5'-ATTCAGGACCCCAACCAAAT-3'	
		DWV 9627T*	5'-FAM-CATGCTCGAGGATTGGGTCGTCGT-TAMRA-3'	

*5' (FAM, 6-carboxy-Fluoresceína); 3' (TAMRA, tetra-metilcarboxyrhodamina)

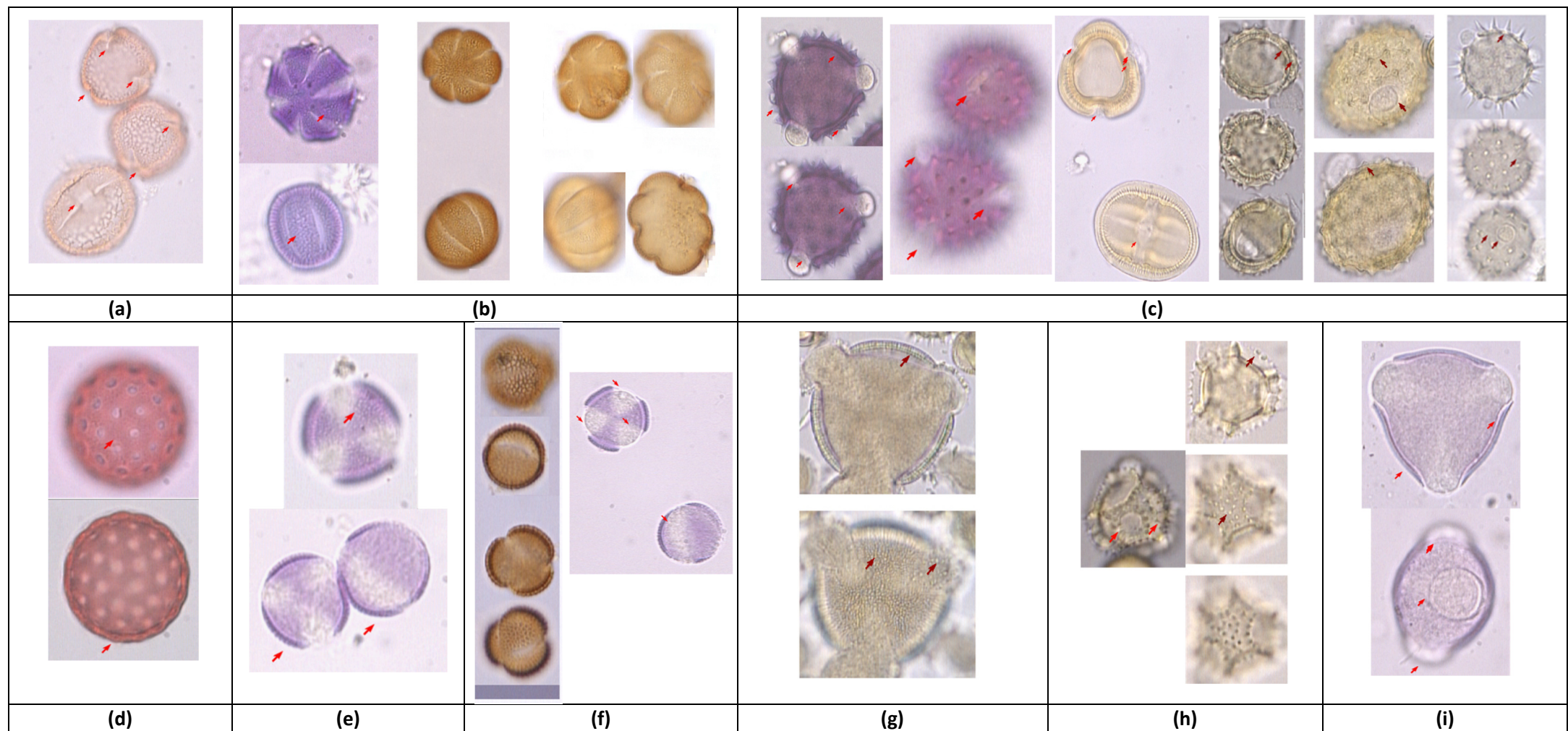


Figure S1. Main taxa identified of the pollen grains found in the beebread samples. Red rows: ornamental features and pollen apertures.

(a) *Hedera helix* (Araliaceae). (b) *Labiatae*: *Lavandula latifolia* L.; *Thymus* L.; *Rosmarinus officinalis* L. (c) *Asteraceae*: *Carduus* t.; *Calendula* t.; *Carlina* t.; *Centaurea* t.; *Carthamus lanatus* L.; *Helianthus annuus* L. (d) *Chenopodiaceae* . (e) *Brassicaceae*: *Diplotaxis* t.; (f) *Brassicaceae* t. (g) *Convolvulaceae*. (h) *Cichorioideae*. (i) *Rosaceae*: *Prunus* t.