

Table S1 - Internal Standards used, Retention Time, LOD/LOQ and repeatability values for synthetic pesticides

	ISTD	RT	LOD ng/g	LOQ ng/g	Repeatability (RSD %)
Fungicides					
Ametoctradin	a	15.2	2.8	9.3	14.3
Azoxystrobin	a	14.8	0.3	1.0	5.2
Boscalid	a	15.0	2.7	8.9	14.8
Carbendazim	b	9.8	0.3	1.0	4.6
Cyflufenamid	a	16.9	1.8	6.1	4.9
Cyproconazole	c	14.4	0.6	2.0	6.6
Cyprodinil	a	15.9	7.9	26.4	15.1
Diéthofencarb	a	14.6	0.2	0.6	6.4
Difenoconazole	c	16.1	3.2	10.8	11.8
Dimethomorph*	a	14.2	0.3	0.9	8.1
Fenbuconazole	c	15.3	1.5	5.1	13.3
Fenhexamid	a	15.0	4.1	13.5	8.2
Fludioxonil	d	14.5	0.7	2.4	3.4
Fluopicolide	a	15.1	0.7	2.4	8.4
Fluopyram	a	15.2	0.3	1.0	9.4
Flusilazole	c	15.2	1.8	5.9	13.3
Hexaconazole	c	15.4	1.7	5.6	11.5
Imazalil	a	13.2	7.5	24.9	20.7
Iprovalicarb*	a	14.6	0.1	0.3	5.6
Mandipropamid	a	14.9	0.3	0.9	4.1
Metalaxyl	a	13.2	0.3	0.9	5.5
Metrafenone	a	17.1	0.7	2.6	7.1
Prochloraz	a	15.8	1.9	6.4	8.5
Pyraclostrobin	a	16.5	0.2	0.7	4.5
Pyrimethanil	a	14.4	5.3	17.6	10.6
Spiroxamine*	a	13.7	1.2	4.1	19.5
Tebuconazole	c	15.2	1.1	3.5	6.7
Thiophanate-methyl	a	12.2	1.5	5.0	10.5
Triadimenol*	c	14.1	1.0	3.0	5.0
Trifloxystrobin	a	17.0	0.2	0.6	7.4
Zoxamide	a	16.4	1.0	3.3	5.8
Insecticides / Acaricides					
DMF (amitraz metabolite)		11,4	3.1	10.4	12.2
Acetamiprid	a	10.5	0.6	1.9	6.3
Buprofezin	a	18.2	0.3	1.0	13.8
Chlorantraniliprole	a	14.0	3.5	11.6	7.2
Clofentezine	a	16.6	11.0	36.8	19.8
Clotianidin	a	9.9	1.5	5.1	6.3
Coumaphos	a	16.5	2.7	8.9	5.2
Cymiazol	a	11.3	2.0	6.8	8.4

Dimethoate	a	10.4	0.2	0.8	5.4
Fipronil	a	15.9	1.3	4.2	6.7
Imidacloprid	a	10.2	1.2	4.0	6.7
Malathion	a	15.4	0.3	1.0	5.3
Methiocarb	a	14.4	0.3	0.9	5.7
Methoxyfenozide	e	15.2	2.4	8.2	11.4
Tebufenozide	e	15.8	8.5	28.3	20.6
Thiacloprid	a	11.3	1.7	5.8	4.6
Thiametoxam	a	9.3	0.6	2.1	4.8
Thiodicarb	a	12.4	0.2	0.6	5.5
Synergist					
Piperonyl butoxid	a	17.5	0.3	0.9	6.8
Herbicides					
Atrazine	a	13.1	1.3	4.5	7.2
Desethyl-atrazine	a	10.2	1.9	6.4	13.8
Diuron	a	13.2	0.5	1.6	6.0
Linuron	a	14.5	3.9	13.0	11.3
Metolachlor	a	15.6	0.3	1.0	6.1
Terbutylazine	a	14.4	1.6	5.3	10.9
Desethyl-terbutylazine	a	12.1	1.1	3.6	4.9

*: mixture of isomers

Internal standards: a, triphenylphosphate; b, carbendazim-d4; c, tebuconazole-d6, d, fludioxonil-13C2, e, tebufenozone-d9

LOD/LOQ: concentrations corresponding to S/N ratio of 3 and 10 respectively

Repeatability : mean of the relative standard deviation (RSD) of 3 replicates (9 samples)

Table S2 - Wave lengths used for the analysis of elements by ICP-AES (A) and Isotopes and mode used for the analysis of trace elements by ICP-MS (B)

A		B		
Element	Wave length (nm)	Element	Isotope	Mode
Aluminium	396.152	Arsenic	75As	He/He
Calcium	422.673	Cadmium	114Cd	No gas
Copper	327.395	Cobalt	59Co	He
Iron	259.940	Chromium	52Cr	He
Sulfur	181.972	Molybdenum	98Mo	No gas
Magnesium	285.213	Lead	208Pb	No gas
Manganese	259.372			
Phosphorous	213.618			
Potassium	766.491			
Zinc	213.857			

Table S3 - Range, Mean and SD of pesticide residues quantified in the Vineyard location.

	Sampling	1 Date 3-May	2 28-May	3 17-Jun	4 8-Jul	5 29-Jul	6 19-Aug	7 9-Sep	8 30-Sep	9 20-Oct
DMF	range ppb									< 10.4
	mean ± SD									< 10.4
ametoctradine	range ppb		20.2 - 351.6	112 - 424.3				< 9.3 *		
	mean ± SD		185.9 ± 234.3	268.2 ± 220.8						
cyflufenamid	range ppb			6.5 *	< 6.1					
	mean ± SD				< 6.1					
difenoconazole	range ppb			19.8 *	< 10.8					
	mean ± SD				< 10.8					
dimethomorph	range ppb		1.8 - 78.9	5.6 - 21.4	< 0.9 - 0.9			< 0.9 *		
	mean ± SD		40.4 ± 54.5	13.5 ± 11.1	< 0.9 ± 0.5					
fenbuconazole	range ppb			< 5.1 *						
	mean ± SD									
fludioxonil	range ppb			4.9 - 24.0			< 2.4 *	< 2.4		
	mean ± SD			14.4 ± 13.5				< 2.4		
fluopicolide	range ppb		< 2.4 - 8.7	22.2 - 117.2			< 2.4 *			
	mean ± SD		4.7 ± 5.6	69.7 ± 67.2						
fluopyram	range ppb			1.1 - 3.4						
	mean ± SD			2.3 ± 1.6						
mandipropamid	range ppb		< 0.9 *	5.1 - 21.1						
	mean ± SD			13.1 ± 11.3						
metrafenone	range ppb			26.6 - 59.6	< 2.6		< 2.6	< 2.6 *		
	mean ± SD			43.1 ± 23.4	< 2.6			< 2.6		
pyrimethanil	range ppb						16.8 - 176.6			
	mean ± SD						96.7 ± 113.0			
tebuconazole	range ppb			< 3.5 *						
	mean ± SD									
trifloxystrobin	range ppb		< 0.6 *	7.2 - 18.7						
	mean ± SD			13.0 ± 8.1						
zoxamide	range ppb			20.1 - 109.4	< 3.3 - 5.6					
	mean ± SD			64.7 ± 63.1	3.3 ± 3.2					

Values are mean of the 3 replicates in each hive (range ppb) and the mean of the two hives (mean ± SD)

* Detected or quantified in only one hive



Figure S1 - Concentrations of trace elements (mg/kg) and sulfur (g/kg) quantified in honey bees sampled between May and October in contrasted locations. Values presented are mean \pm SE of the two hives placed at each location (Forest, Sub-urban, Urban, Vineyard).

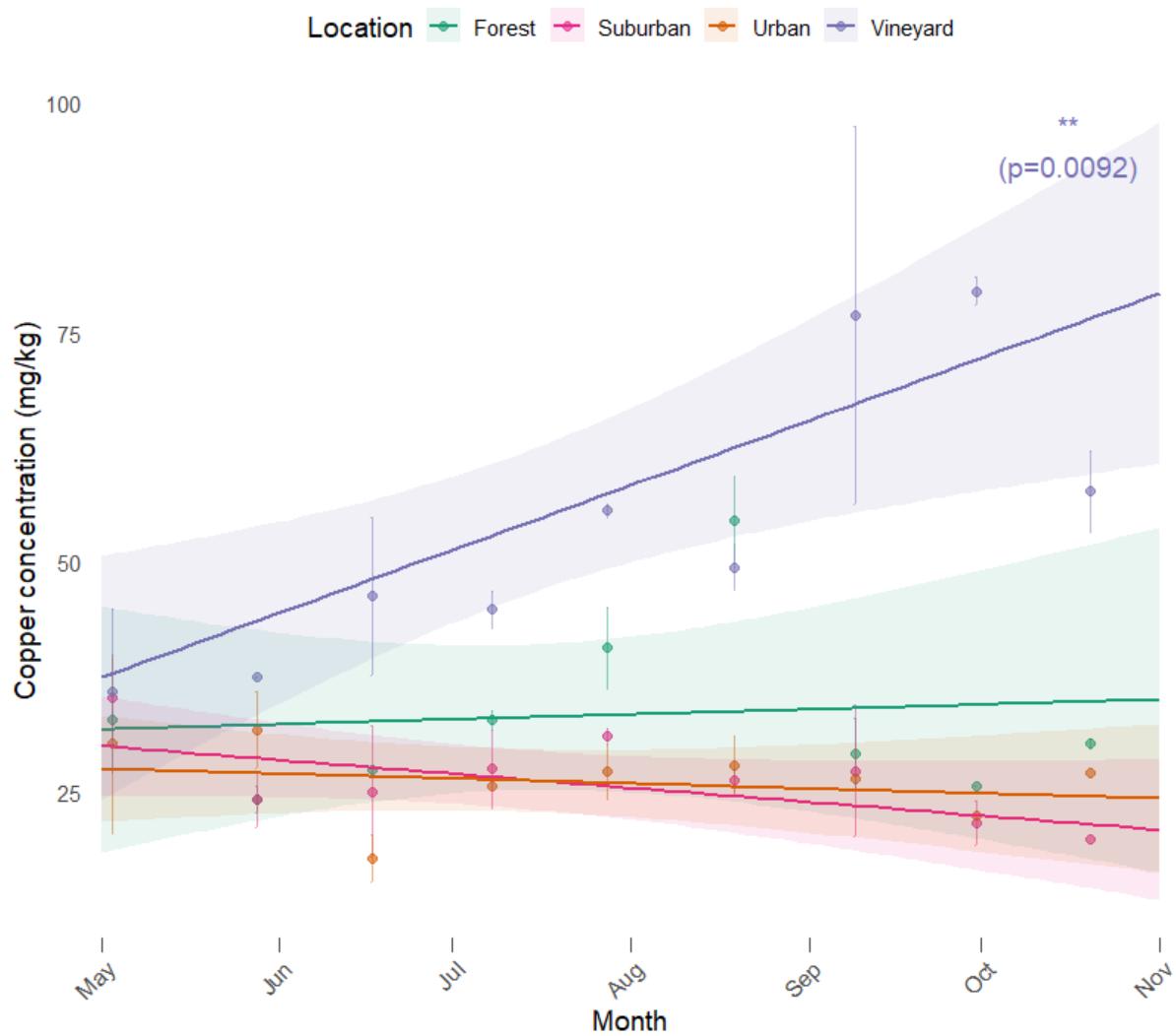


Figure S2 - Evolution of copper concentrations in honey bees by location. Dots are true sampling dates and fitted lines represent trends over the study period. The monthly bioaccumulation of copper was calculated through the estimation of slopes in each Location. Increasing concentrations of copper with time was revealed in Vineyards only (lm, estimate: 6.95 ± 1.95 , p-value = 0.00918) whereas other locations did not exhibit any significant positive or negative relationship (p-value, Forest = 0.788, Sub-urban = 0.0986, Urban = 0.550).