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Supplementary information: Studies on the botanical origin and the residues of pesticides in corbicular pollen loads and bee bread of bee colonies in the proximity of apple orchards in South Tyrol

Zusatzinformationen: Untersuchungen zur botanischen Herkunft und den Rückständen von Pflanzenschutzmitteln in Pollenhöschen und Bienenbrot von Bienenvölkern im Einzugsgebiet des Obstbaus von Südtirol

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Materials and methods

Sites of collection

To get a better idea of the geographical distribution of the exact position of the apiaries see the map of Figure 1. The apiary Lana in 2020 had to be shifted for about 1 km to the east.

Table S1. Exact position of the apiaries.

Village	Coordinates	Altitude (m a. s. l.)
Lana	46°37'09.3"N 11°08'39.3"E	300
Tirol	46°40'29.0"N 11°09'55.7"E	487
Rabland	46°40'26.0"N 11°03'17.7"E	530
Kaltern	46°40'41.0"N 11°25'15.3"E	315

Figure S2. Apiary Tirol in 2020 with the five colonies where pollen combs were regularly taken out in the red hives and two colonies beside them in brown hives, where corbicular pollen loads were collected using front porch pollen traps.

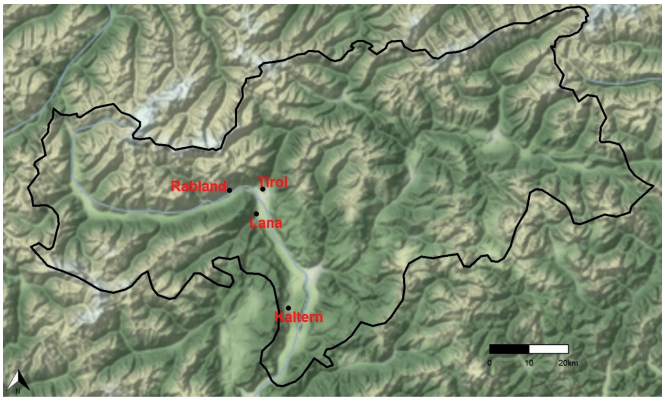

Figure S1. The map shows the province South Tyrol (Northern Italy) and the position of the apiaries are marked on it.

Corbicular pollen loads

Generally, only one of the two colonies was used for collection. When the weather conditions were not optimal suited for flight activity, both colonies were used to collect pollen in order to get enough material to make palyonological or/and chemical analysis. The front porch pollen traps we used were not active every day.

Bee bread

Sometimes (especially in early spring) it was possible that pollen combs could be extracted from only two or one of the five colonies because resources were rare. Immediately after extraction, combs were frozen at -80°C for a few days and then the combs were crumbled, to get only the prisms of bee bread. Unfortunately, only a few samples were analysed from the years 2016 and 2017, because in these two years we focused on the analysis of corbicular pollen loads.

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Pesticide residue analysis

Two laboratories were involved in the analysis of our corbicular pollen loads and bee bread samples: Greit (Bologna, Italy) was looking for 533 substances in 327 samples and LUFA (Landwirtschaftliche Untersuchungs- und Forschungsanstalt Speyer, Germany) for 401 in 108 samples (active substances searched by laboratory listed in the attachment).

To compare all samples from both laboratories, the higher limit of quantification (LOQ) exerted by one of them had to be chosen (Table 2). Flupyradifurone and Sulfoxaflor were used in agricultural praxis of the investigated area only in 2019 and 2020 and LUFA made analysis only of samples from 2016 and 2017 and therefore did not search for those two products.

Pesticide residue evaluation

The calculation of the PHQ relies on the measured concentration and the oral LD_{50} of the detected pesticide:

$$\frac{\text{concentration [µg/kg]}}{\text{LD 50[µg/bee]}}.$$

Results

It was not possible to analyse the same number of samples of each apiary every year neither chemical nor palynological. The samples for analysis were chosen according to the observed mortality in front of the colonies (on those placed near them which were used to collect corbicular pollen loads) and were therefore different between years and sites. Table 3 gives an overview of the analysed samples.

At least five (Rabland 2020) and a maximum of 20 samples (Tirol 2016) per year and site were analysed chemically from corbicular pollen loads. At least one (Rabland 2016 and 2017) and a maximum of 31 samples (Tirol 2019) of bee bread were analysed chemically per year and site. Most of the bee bread samples were analysed between 2018 and 2020 (in total 226 in comparison to 24 from the years 2016 to 2017) whereas the most (56) corbicular pollen load samples were chemically analysed in 2016 and the fewest (24) in 2019. Most of the palynological analyses were made in 2020, with a maximum of 20 samples (on apiary Tirol and Lana). No palynological analyses on the bee bread samples were made.

In Table 4, we tried to analyse to which degree the contaminations with the most toxic plant protection product for honeybees detected in our observations reached the LD50. The table is divided into two sections: the first seventeen rows pertain to the contamination of corbicular pollen loads and the last 17 to the contamination of bee bread. In the corbicular pollen load samples from 2016 to 2018, the percentage of samples which contained Imidacloprid was between 36 and 67%, whereas from 2019 to 2020, it was found to be between 0 and 9%. Assuming that nurse bees would consume only the fresh pollen, collected and brought to the hive by the foragers, the detected concentrations of Imidacloprid implied that for 55 times 5%, 31 times 10%, 4 times 50% and even 2 times 100% of the LD50 were exceeded (daily consumption of 9.5 g pollen/nurse bee). By a consumption of only bee-

Table S2. LOQ (mg/kg) for the active substances of interest by laboratory.

active substance	LOQ [mg/kg]	
	Greit	LUFA
Abamectin	0.01	0.01
Chlorantraniliprole	0.01	0.005
Chlorpyrifos-ethyl	0.01	0.015
Chlorpyrifos-methyl	0.01	0.015
Dimethoate	0.01	0.005
Etofenprox	0.01	0.015
Fenoxycarb	0.01	0.005
Flupyradifurone	0.01	-
Imidacloprid	0.01	0.005
Indoxacarb	0.01	0.015
Phosmet	0.01	0.005
Pyrethrins	0.01	0.01
Pyriproxifen	0.01	0.015
Spinosad	0.01	0.005
Spirodiclofen	0.01	0.005
Spirotetramat	0.01	0.005
Sulfoxaflor	0.01	-
Thiacloprid	0.01	0.005
Thiamethoxam	0.01	0.001

Table S3. Number of analysed samples per apiary and year.

year	apiary	corbicular pollen load samples		bee bread samples
		chemical analysis	palynological analysis	chemical analysis
2016	Tirol	20	11	2
2017		14	9	8
2018		11	11	27
2019		6	4	31
2020		11	20	21
Total Tirol		***62***	***55***	***89***
2016	Lana	18	9	3
2017		17	6	9
2018		11	12	22
2019		9	8	30
2020		12	20	21
Total Lana		***67***	***55***	***85***
2016	Rabland/ Kaltern	18	6	1
2017		14	8	1
2018		10	10	25
2019		9	3	29
2020		5	15	20
Total Rabland		***56***	***42***	***76***
TOTAL		**185**	**152**	**250**

Table S4. Overview of the degree to which contaminations with Imidacloprid reached the LD50.

matrix	year	apiary	abs. analysed samples	detections of imidacloprid	% of samples with Imidacloprid	no. of samples where the conc. implies a consumption > × % of the LD50 in 1 day			
						5%	10%	50%	100%
Corbicular pollen loads	2016	Tirol	20	10	50	10	3	1	
	2017		14	4	29	4	2		
	2018		11	4	36	3	1		
	2019		6						
	2020		11	2	9	2	1		
	2016	Lana	18	12	67	11	10	2	1
	2017		17	7	41	4	1		
	2018		11	6	55	3	2		
	2019		9						
	2020		12						
	2016	Rabland/ Kaltern	18	11	61	9	8	1	1
	2017		14	7	50	6	3		
	2018		10	4	40	3			
	2019		9						
	2020		5						
	Total		185	67		55	31	4	2
Bee bread	2016	Tirol	2						
	2017		8	2	25				
	2018		27	5	19	4	2		
	2019		31						
	2020		21						
	2016	Lana	3	1	33				
	2017		9	1	11				
	2018		22	5	23	1			
	2019		30	2	7				
	2020		21						
	2016	Rabland/ Kaltern	1						
	2017		1						
	2018		25	4	16	1			
	2019		29						
	2020		20						
	Total		**250**	**20**		**6**	**2**		

bread with the concentrations we measured, 4 times 5% and 2 times 10% of the LD50 were exceeded. However, in the bee bread samples already the percentage of samples contaminated with Imidacloprid was lower. In bee bread from 2016 to 2018, 0–33% samples contained Imidacloprid and from 2019 to 2020, 0–7%.

With regards to the PHQ for the corbicular pollen loads, no statistically significant difference between the sites were detected, but differences between the years were detected: the PHQ detected in 2017 and 2020 were significantly lower than those from 2016 (1,617.2 ± 4,552.9 resp. 531.2 ± 1,441.6 resp. 7,385.2 ± 30,116.7) (Table 5).

In the calculated PHQ of the analysed bee bread samples, no sign. differences between years or sites have been found. However, PHQ for bee bread was generally lower than for corbicular pollen loads, which is also true for the concentrations of plant protection products detected.

The results in Table 6 show that some species like *Acer negundo* (77.6%), *Castanea sp.* (83.3%), *Fraxinus ornus* (89,7%), *Trachycarpys sp.* (85.5%), *Ligustrum sp.* (80.9%), *Malus/Pyrus-form* (83.3%), *Populus sp.* (87.2%) or *Salix sp.* (92%), contributed with amounts of more than 75% to the daily collected pollen. Other species arrived at lower maximum but were present in a high number of samples (for example *Aes-*

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Table S5. Observed PHQ by year and site (mean ± sd) in corbicular pollen loads. One-way-Anova followed by a Tukey HSD (Tukey Honest Significant Differences) for performing multiple pairwise-comparison between the means of groups (α = 5%). Means in a line within the borders followed by the same letter did not differ significantly.

	apiary			Total
	Lana	Rabland	Tirol	
2016	12209 ±47642 a	6038 ±18662 a	3768 ± 9472 a	**7385.2±30116.7 a**
2017	1110 ± 2776 a	2421 ± 6604 a	1315 ± 3073 a	**1617.2±4552.9 b**
2018	2587 ± 5771 a	1560 ± 2532 a	1600 ± 2924 a	**1903.9±3949.9 ab**
2019	1628 ± 3485 a	1059 ± 1868 a	958 ± 1682 a	**1353.4±2829.9 ab**
2020	463 ± 945 a	252 ± 441 a	750 ± 2160 a	**531.2±1441.6 b**
Total	**4184.5 ± 2497.8 a**	**3318.5 ± 11940.4 a**	**2084.2 ± 6006.5 a**	

culus sp. with max. 17.2% was present in 35 samples). The most frequent detected species were T-Form from *Asteraceae* (101), *Malus/Pyrus* (88), *Acer* (77) and *Fraxinus ornus* (71). The T-Form from *Asteraceae* was the most frequent identified species but their mean value for the collected pollen portions was only 6.8% (max. portion 49.3%). High mean portions were identified for *Castanea sp.* (36.86%), *Fraxinus ornus* (23.89%) or *Salix* (32.4%). Looking at the most important agricultural managed fruit productions, *Malus/Pyrus-form* arrived at a mean portion of 15.68% (maximum value 83.3% and 88 detections) whereas Vitis reached a mean value of 5.1% (maximum value 23% and 10 detections).

Table S6. Maximum and mean portions of different plant species which were identified in the analysed pollen load samples. The numbers of detections are listed in the last column.

plant family	plant species/pollen type	mean %	max %	number of detections
Aceraceae	Acer	8.41	52.10	77
Aceraceae	Acer japonicum	1.40	1.40	1
Aceraceae	Acer negundo	19.99	77.60	19
Aceraceae	Acer palmatum	2.69	10.20	9
Aceraceae	Acer palmatum cf.	0.57	0.80	3
Actinidiaceae	Actinidia	2.34	3.80	5
Altingiaceae	Liquidambar	4.60	4.60	1
Amaryllidaceae	Allium	1.50	1.50	1
Apiaceae	A/H-Form	7.83	57.30	35
Aquifoliaceae	Ilex	1.73	5.60	7
Aquifoliaceae	Mahonia	2.25	3.20	2
Asparagaceae	Anthericum	1.00	1.00	1
Asparagaceae	Muscari	1.80	1.80	1
Asparagaceae	Ornithogalum	1.58	2.50	6
Asparagaceae	Ornithogalum	1.66	3.30	5
Asparagaceae	Scilla	1.40	1.40	1
Asteraceae	A-Form	0.70	1.90	5
Asteraceae	H-Form	1.90	6.70	8
Asteraceae	H-Form	0.60	0.60	1
Asteraceae	J-Form	0.20	0.20	1
Asteraceae	T-Form	6.68	49.30	101
Attingiaceae	Liquidambar	0.43	1.30	3
Berberidaceae		0.07	0.20	3
Berberidaceae	Berberis	2.90	2.90	1
Berberidaceae	Borago	0.00	0.00	1
Berberidaceae	Mahonia	1.45	1.50	2

Table S6. Continued.

plant family	plant species/pollen type	mean %	max %	number of detections
Betulaceae	Alnus	0.00	0.00	3
Betulaceae	Betula	5.07	25.20	15
Betulaceae	Carpinus	1.35	1.40	2
Betulaceae	Corylus	2.73	5.70	3
Betulaceae	Ostrya	1.80	2.30	2
Boraginaceae	Anchusa/Pulmonaria-Gr.	0.73	1.50	4
Boraginaceae	Echium	2.40	2.40	1
Boraginaceae	Myosotis	0.00	0.00	1
Brassicaceae		2.61	16.50	54
Buxaceae	Buxus	6.12	27.20	15
Cactaceae	Opuntia	0.00	0.00	1
Caesalpiniaceae	Gleditsia	12.50	52.50	26
Caprifoliaceae	Kolkwitzia	0.80	1.50	5
Caprifoliaceae	Lonicera	1.25	6.30	17
Caprifoliaceae	Sambucus	1.61	6.30	15
Caprifoliaceae	Viburnum	3.49	15.50	32
Caprifoliaceae	Viburnum	1.60	1.60	1
Caprifoliaceae	Weigela	0.63	1.40	7
Caryophyllaceae		1.01	3.80	17
Caryophyllaceae	Stellaria	2.95	4.60	2
Caryophyllaceae		2.60	2.60	1
Cistaceae	Cistus	2.96	8.00	12
Cistaceae	Helianthemum	0.96	4.40	5
Commelinaceae		0.10	0.20	2
Coniferopsida	Taxus	1.00	1.00	1
Convolvulaceae	Calystegia	0.00	0.00	1
Convolvulaceae	Convolvulus	0.50	1.00	2
Cornaceae	Cornus	1.06	3.90	5
Cornaceae	Cornus mas	0.85	1.40	2
Cornaceae	Cornus sanguinea	5.37	34.90	16
Cornaceae	Cornus sp.	5.60	5.60	1
Corylaceae	Carpinus	0.30	0.30	1
Corylaceae	Corylus	0.62	1.90	5
Corylaceae	Ostrya	0.25	1.00	11
Crassulaceae		1.20	4.30	4
Cucurbitaceae	Briyonia	0.00	0.00	1
Cucurbitaceae	Bryonia	0.10	0.10	1
Cupressaceae		0.31	1.40	7
Cyperaceae		1.08	3.30	12
Dipsacaceae	Knautia	2.33	7.30	11
Ericaceae		0.60	2.40	7
Ericaceae	Calluna vulgaris	1.10	1.10	1
Euphorbiaceae	Euphorbia	0.39	1.80	7
Fabaceae		3.28	7.60	4
Fabaceae	Cercis	2.59	11.90	7
Fabaceae	Genista-Form	2.85	5.10	2
Fabaceae	Gleditsia	22.12	44.00	5
Fabaceae	Lathyrus/Vicia	0.53	1.30	3
Fabaceae	Lotus-Gruppe	0.88	2.50	4

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Table S6. Continued.

plant family	plant species/pollen type	mean %	max %	number of detections
Fabaceae	Robinia	7.65	28.90	32
Fabaceae	Trifolium pratense-Gruppe	2.15	6.00	6
Fabaceae	Trifolium repens-Gruppe	9.36	74.40	27
Fagaceae	Castanea	36.86	83.30	14
Fagaceae	Fagus	0.15	0.20	2
Fagaceae	Quercus	9.18	41.90	37
Fagaceae	Quercus ilex	14.50	64.30	21
Fagaceae	Quercus ilex	3.80	3.80	1
Fagaceae	Tilia	10.85	44.70	11
Fumariaceae	Corydalis	0.15	0.30	2
Geraniaceae	Geranium	1.60	1.60	1
Geraniaceae	Pelargonium	1.70	1.70	1
Hamamelidaceae	Parrotia	13.70	27.10	2
Hippocastanaceae	Aesculus	5.93	17.20	43
Hydrangeaceae		3.40	6.20	5
Iridaceae	Crocus	0.40	0.90	6
Juglandaceae		0.10	0.20	3
Juglandaceae	Juglans regia	2.23	4.70	4
Juncaceae		0.25	0.30	2
Lamiaceae		0.30	0.30	1
Lamiaceae	L-Form	1.03	1.60	3
Lamiaceae	Lamium purpureum	1.00	1.00	1
Lamiaceae	M-Form	1.20	5.10	14
Lamiaceae	S-Form	0.82	2.70	11
Lauraceae	Laurus	3.51	5.70	8
Liliaceae	Tulipa	1.60	1.80	2
Liliaceae i. w. Sinne		1.08	9.60	16
Lythraceae	Punica	0.50	1.10	3
Magnoliaceae	Liriodendron	2.74	12.20	42
Magnoliaceae	Magnolia	8.39	57.20	13
Magnoliaceae	Magnolia	1.10	1.10	1
Malvaceae	Malva neglecta – Typ	1.20	1.20	1
Moraceae	Maclura	2.00	2.00	1
non-evaluable		10.07	37.00	62
non-evaluable	varia	2.67	9.30	40
non-evaluable	Varia	4.80	4.80	1
Oleaceae	Forsythia	1.00	1.50	4
Oleaceae	Fraxinus excelsior	2.00	4.50	3
Oleaceae	Fraxinus ornus	23.89	89.70	71
Oleaceae	Jasminum nudiflorum	2.20	2.20	1
Oleaceae	Ligustrum/Syringa	11.82	80.90	27
Oleaceae	Olea	0.86	2.30	5
Oxalidaceae	Oxalis	0.00	0.00	1
Palmae	Trachycarpus	19.65	85.50	52
Papaveraceae		3.12	12.80	36
Pinaceae	Picea	0.21	2.30	13
Pinaceae	Pinus	1.94	25.00	34
Plantaginaceae	Plantago	1.37	7.20	22
Plantaginaceae	Plantago lanceolata	5.46	39.50	11

Table S6. Continued.

plant family	plant species/pollen type	mean %	max %	number of detections
Plantaginaceae	Plantago lanceolata	0.90	0.90	1
Poaceae		0.76	3.10	20
Polygonaceae		1.20	2.80	5
Polygonaceae	Fagopyrum	2.40	3.50	2
Polygonaceae	Polygonum persicaria-Gr.	0.00	0.00	1
Polygonaceae	Rumex	1.40	3.90	3
Polygonaceae	Rumex acetosa – Typ	2.85	4.50	2
Ranunculaceae		1.52	4.80	32
Ranunculaceae	Adonis	0.60	0.60	1
Ranunculaceae	Anemone	0.10	0.30	3
Ranunculaceae	Anemone coronaria	0.70	1.20	2
Ranunculaceae	Clematis-Gruppe	1.19	3.10	8
Ranunculaceae	Helleborus	0.10	0.10	1
Ranunculaceae	Ranunculus acris – Typ	2.45	6.00	11
Ranunculaceae	Thalictrum	0.30	0.30	1
Rhamnaceae		0.48	1.60	8
Rosaceae		5.65	49.50	24
Rosaceae	Agrimonia	0.10	0.20	2
Rosaceae	Aruncus – Typ	0.92	2.10	5
Rosaceae	Filipendula	7.50	12.10	2
Rosaceae	Fragaria/Potentilla-Form	0.79	1.70	16
Rosaceae	Malus/Pyrus-Form	15.68	83.30	88
Rosaceae	Prunus-Form	14.05	66.70	69
Rosaceae	Rosa – Typ	6.21	28.60	28
Rosaceae	Rubus-Form	7.73	64.80	40
Rosaceae	Sanguisorba minor	1.35	1.40	2
Rosaceae	Spiraea	1.30	1.30	1
Rutaceae	Citrus	2.40	2.40	1
Rutaceae	Skimmia	0.79	1.80	8
Rutaceae	Tetradium	3.30	3.30	1
Salicaceae	Populus	14.98	87.20	20
Salicaceae	Salix	32.40	92.00	49
Scrophulariaceae	Sambucus	1.00	1.00	1
Scrophulariaceae	Verbascum	12.75	22.00	2
Scrophulariaceae	Veronica	4.09	18.60	14
Scrophulariaceae	Veronica	1.95	2.70	2
Simaroubaceae	Ailanthus	1.68	4.40	11
Simaroubaceae	Ailanthus	2.50	2.50	1
Solanaceae		2.40	3.40	2
Taxucaceae	Taxus	4.60	4.60	1
Theaceae	Camellia	3.06	8.50	13
Tiliaceae	Tilia	2.19	4.80	7
Ulmaceae	Celtis	0.10	0.10	1
Ulmaceae	Ulmus	1.88	4.20	5
Urticaceae		0.10	0.10	1
Verbenaceae	Verbena	3.55	5.90	2
Violaceae		0.65	1.20	2
Vitaceae	Parthenocissus	3.57	17.00	16
Vitaceae	Vitis	5.11	23.00	10

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Discussion

In our approach to analyse the degree to which the LD50 was achieved (see Table S3) within one day, it is important to remember that this analysis is based only on the most toxic substance detected in our observations (Imidacloprid). The use of this product was permitted from 2016 to 2018 in apple orchards of the investigated area and there were therefore more detections of this molecule in those years and only a few in 2019 and 2020. Furthermore, in 2016 and 2017, more corbicular pollen load samples were analysed and fewer bee bread samples, whereas from 2017 to 2020, fewer corbicular pollen load samples and more bee bread samples were analysed. This is probably the reason why more-frequent detections of Imidacloprid in the corbicular pollen loads from 2016 to 2017 did not show more-frequent detections in the bee bread samples of the same years.

Although it must be considered that, regarding the corbicular pollen loads, more analyses were carried out in 2016 (56) than in 2017 (45) or 2020 (28), the sign. differences in the PHQ-values (7,385.2 ± 30,116.7 resp. 1,617.2 ± 4,552.9 resp. 531.2 ± 1,441.6) revealed in our study show that the risk to which honeybees are exposed is not the same every year. This is not in agreement with the complaints of some beekeepers according to which the effects of plant protection products harmful to bees on their colonies are the same every year. At least when focussing only on the issue of pollen diet, this seems to be not true.

Nonetheless, there are some critical aspects regarding PHQ to be mentioned. This method does not take into account the fact that the toxicity is not the same during the different developmental stages of a bee (different susceptibility between larvae and adult bees) or that nursing bees consume more pollen than foragers (Stoner & Eitzer, 2013; Rortais et al., 2005; Aupinel et al., 2007; Tasei, 2001). Another point which has to be considered is that the published LD50 values on which our calculations rely were obtained from feeding tests with a sugar solution, whereas for our study the concentrations we took into consideration were measured in corbicular pollen loads or bee bread samples (Stoner & Eitzer, 2013). What is more, pesticide interactions are also not considered (for example synergism or antagonism) (Traynor et al., 2016). The combination of different substances in one sample has been shown also in some other studies (Mullin et al., 2010; Traynor et al., 2016; Pettis et al., 2013; Tosi et al., 2018; Böhme et al., 2018; Favaro et al., 2019; Sartori et al., 2020) and also the possible negative effects of sub-lethal concentrations like impairment of behaviour, performance, learning, memory, homing (Andrione et al., 2016; Tosi et al., 2017; Teeters et al., 2012; Decourtye et al., 2005; Fischer et al., 2014; Urlacher et al., 2016; Smagghe et al., 2013), growth development (Wu et al., 2011), queen fecundity (Wu-Smart & Spivak, 2016), and social interactions (Forfert & Moritz, 2017; Medrzycki et al., 2003).

Attachment

Table S7. List of the active substances searched in the samples of bee bread and corbicular pollen loads by laboratory.

Active substance	Laboratory	
	Greit	Lufa
2,4-DDD		X
2,4-DDE		X
2,4-DDT		X
4,4-DDD		X
4,4-DDE		X
4,4-DDT		X
2,4,5-T (sum of 2,4,5-T, and it's salts expressed as 2,4,5-T)	X	
2,4-D (sum of 2,4-D, and it's salts expressed as 2,4-D)	X	
2,4-DB (sum of 2,4-DB, and it's slats expressed as 2,4-DB)	X	
2,4-DIMETHYLANILINE	X	
2-PHENYLPHENOL	X	
3-CHLOROANILINE	X	
3-HYDROXYCARBOFURAN	X	
4,4-DICHLOROBENZOPHENONE (4,4-DBP)	X	
4-CHLORO-3-METHYLPHENOL	X	
6-BENZYLADENINA	X	
ABAMECTIN (sum of avermectin B1a, B1b and isomer of Delta 8,9-avermectin B1a)	X	

Active substance	Laboratory	
	Greit	Lufa
ACEPHATE	X	
ACEQUINOCYL	X	
ACETAMIPRID	X	X
ACETOCHLOR	X	X
ACIBENZOLAR-S-METHYL (sum of acibenzolar-Smethyl and of acibenyolare acid expressed as acibenzolar-s-methyl)	X	X
ACLONIFEN	X	X
ACRINATHRIN	X	X
ALACHLOR	X	X
ALDICARB	X	X
a-HCH		X
ALDICARB (sum of aldicarb, aldicarb sulfossido and sulfone, expressed as aldicarb)	X	
ALDICARB SULFONE	X	
ALDICARB SULFOXIDE	X	X
ALDRIN	X	X
Aldoxycarb		X
ALDRIN AND DIELDRIN (aldrin and dieldrin combined, expressed as dieldrin)	X	
alpha-CYPERMETHRIN (aka alphamethrin)	X	

Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
alpha-ENDOSULFAN	X	
AMETOCTRADIN	X	
AMETRYN	X	X
AMINOCARB		X
AMISULBROM	X	
AMITRAZ	X	X
AMITRAZ (including it's metabolites containing the fraction of 2,4-dimethylaniline expressed as amitraz)	X	X
ANILAZINE	X	
ASULAM	X	
ATRAZINE	X	X
ATRAZINE-DESETHYL	X	X
ATRAZINE-DESISOPROPYL	X	
AZADIRACHTIN	X	X
AZAMETHIPHOS	X	X
AZINPHOS ETHYL	X	X
AZINPHOS METHYL	X	X
AZOCYCLOTIN	X	
AZOCYCLOTIN E CYHEXATIN (sum of azocyclotin and cyexatin expressed as Cyehexatin)	X	
AZOXYSTROBIN	X	X
BEFLUBUTAMID		X
BENALAXYL	X	X
BENDIOCARB	X	X
BENFLURALIN	X	X
BENFURACARB	X	
BENOMYL	X	
BENTAZONE (sum of bentazone and it's salts 6-idrossi bentazone and 8-idrossi bentazone expressed as bentazone)	X	
BENTHIAVALICARB (Benthiavalicarb-isopropil (KIF-230 RL) and it's enantiomer (KIF-230 S-D) and diastereomer (KIF-230 S-L e KIF-230 R-D) expressed as benthiavalicarbisoprop)	X	X
b-HCH		X
BIFENOX		X
BENZOXIMATE	X	
BENZOYLPROP-ETHYL	X	
beta-CYFLUTHRIN	X	
beta-ENDOSULFAN	X	X
BIFENAZATE (sum of bifenazate and bifenazate diazene expressed as bifenazate)	X	
BIFENTHRIN	X	X
BIPHENYL		X
BIORESMETHRIN	X	
BITERTANOL	X	X
BIXAFEN		X
BNOA (2-naphthyloxyacetic acid)	X	
BOSCALID	X	X

Active substance	Laboratory	
	Greit	Lufa
BROMACIL	X	X
BROMOPHOS	X	X
BROMOPHOS ETHYL	X	X
BROMOPROPYLATE	X	X
BROMOXYNIL and it's salts, expressed as bromoxynil	X	
BROMUCONAZOLE (sum of diastereoisomers)	X	X
BUPIRIMATE	X	X
BUPROFEZIN	X	X
BUTAFENACIL		X
BUTOCARBOXIM	X	X
BUTOXYCARBOXIM	X	
BYI08330-ENOL (Spirotetramat metabolite)	X	X
BYI08330-ENOL-GLUCOSIDE (Spirotetramat metabolite)	X	
BYI08330-KETOHYDROXY (Spirotetramat metabolite)	X	
BYI08330-MONOHYDROXY (Spirotetramat metabolite)	X	
CADUSAFOS	X	X
CAPTAFOL	X	
CAPTAN	X	X
CAPTAN (sum of Captan and Tetraidroftalimmide)	X	
CARBARYL	X	X
CARBENDAZIM	X	X
CARBETAMID		X
CARBENDAZIM AND BENOMYL (sum of carbendazim and benomyl expressed as carbendazim)	X	
CARBOFURAN	X	X
CARBOFURAN and 3-hydoxycarbofuran expressed as carbofuran	X	X
CARBOPHENOTHION	X	
CARBOSULFAN	X	X
CARBOXIN	X	X
CARFENTRAZONE (free acid)	X	
CARFENTRAZONE ETHYL (determined as carfrentazone and expressed as carfentrazone ethyl)	X	X
CHINOMETHIONAT	X	
CHLORANTRANILIPROLE	X	X
CHLORBENZILATE	X	X
CHLORDANE (sum of cis- and trans-chlordane)	X	X
CHLORFENAPYR	X	X
CHLORDIMEFORM		X
CHLORFENSON	X	
CHLORFENVINPHOS	X	X
CHLORFLUAZURON	X	X
CHLORIDAZON	X	X
CHLORONEB		X

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Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
CHLORMEPHOS	X	
CHLOROPROPYLATE	X	
CHLOROTHALONIL	X	
CHLOROXURON	X	X
CHLORPROPHAM	X	X
CHLORPYRIFOS	X	X
CHLORPYRIFOS METHYL	X	X
CHLORSOLFURON	X	
CHLORTHAL DIMETHYL	X	X
CHLORTHIOPHOS	X	X
CHLORTOLURON	X	X
CHLOZOLINATE	X	X
CLETHODIM	X	X
CLIMBAZOL		X
CLETHODIM (sum of sethoxydim and clethodim)	X	
CLODINAFOP and it's S-isomers or salts, expressed as clodinafop	X	
CLODINAFOP-PROPARGYL	X	X
CLOFENTEZINE	X	X
CLOMAZONE	X	X
CLOPYRALID	X	
CLOQUINTOCET	X	
CLOQUINTOCET-MEXYL	X	X
CLOTHIANIDIN	X	X
COUMAPHOS	X	X
CYANAZINE	X	X
CYANOPHOS		X
CYANTRANILIPROLE	X	
CYAZOFAMID	X	X
CYCLOATE	X	X
CYCLOXYDIM	X	
CYFLUFENAMID (sum of Cyflufenamid isomer Z and E)	X	X
CYFLUMETOFEN	X	
CYFLUTHRIN (including sum of isomers)	X	X
CYHALOFOP BUTILE	X	
CYHEXATIN	X	
CYMIAZOLE	X	
CYMOXANIL	X	X
CYPERMETHRIN (including sum of isomers)	X	X
CYPROCONAZOLE	X	X
CYPRODINIL	X	X
CYROMAZINE	X	
DDT (sum of p,p´-DDT, o,p´-DDT, p,p´-DDE and p,p´- TDE (DDD) expressed as DDT)	X	
DEET	X	X
DELTAMETHRIN (cis-deltamethrin)	X	X
DEMETON-S-METHYLSULFONE	X	X

Active substance	Laboratory	
	Greit	Lufa
DEMETON-S-METHYL		X
d-HCH		X
DESMEDIPHAM	X	
DIAFENTHIURON	X	
DIALIFOS	X	X
DIAZINON	X	X
DICAMBA	X	
DICHLOBENIL	X	X
DICHLOFENTHION	X	X
DICHLOFLUANID	X	
DICHLORPROP (sum of dichlorprop (including dichlorprop-P) and it's salts expressed as dichlorprop)	X	
DICHLORVOS	X	X
DICLOBUTRAZOL	X	X
DICLOFOP	X	
DICLOFOP-METHYL	X	X
DICLORAN	X	X
DICOFOL (sum of isomers p, p´ e o,p´)	X	X
DICROTOPHOS	X	X
DIELDRIN	X	X
DIETHOFENCARB	X	X
DIFENOCONAZOLE	X	X
DIFLUBENZURON	X	X
DIFLUFENICAN	X	X
DIMEFOX		X
DIMETHOATE	X	X
DIMETHOMORPH (sum of isomers)	X	X
DIMOXYSTROBIN	X	X
DIMETACHLOR		X
DIMETHANAMID		X
DIMEFURON		X
DINOTEFURAN		X
DINICONAZOLE (sum of isomers)	X	X
DINITRAMINE	X	
DINOCAP (sum of isomers and it's corrisponding fenols expressed as dinocap)	X	
DIOXACARB	X	
DIPHENAMID	X	X
DIPHENYL	X	
DIPHENYLAMINE	X	
DISULFOTON (sum of disulfoton, disulfoton sulfoxide and sulfone expressed as disulfoton)	X	X
DISULFOTON-SULFON		X
DISULFOTON-SULFOXID		X
DITALIMFOS	X	
DITHIANON	X	
DIURON	X	X

Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
DODEMORPH		X
EDIFENPHOS		X
DMST	X	
DODIN	X	
EMAMECTIN BENZOATE B1a expressed as Emamectin	X	
EMAMECTIN BENZOATE B1b	X	
alpha-ENDOSULFAN	X	X
ENDOSULFAN SULPHATE	X	X
ENDRIN	X	X
EPN	X	X
EPOXICONAZOLE	X	X
EPTC (ETHYL DIPROPYLTHIOCARBAMATE)	X	X
ES-TETRAVALENT-RR,SS		X
ES-FENVALERAT-RR,SS		X
ETHIDIMURON		X
ETACONAZOLE	X	X
ETHALFLURALIN	X	X
ETHIOFENCARB	X	X
ETHION	X	X
ETHIOFENCARBSULFON		X
ETHIOFENCARBSULFOXID		X
ETHIRIMOL (Bupirimate metabolite)	X	
ETHOFUMESATE	X	X
ETHOPROPHOS	X	X
ETOFENPROX	X	X
ETOXAZOLE	X	X
ETRIDIAZOLE	X	X
ETRIMFOS	X	X
FAMOXADONE	X	X
FENAMIDONE	X	X
FENAMIPHOS	X	X
FENAMIPHOS SULFONE	X	
FENAMIPHOS SULFOXIDE	X	
FENARIMOL	X	
FENAZAQUIN	X	X
FENBUCONAZOLE	X	X
FENCHLORAZOL-ETHYL		X
FENBUTATIN OXIDE	X	
FENCHLORPHOS (sum of fenchlorphos and fenchlorphos oxon expressed as fenchlorphos)	X	X
FENHEXAMID	X	
FENITROTHION	X	X
FENOPROP (2,4,5-TP)	X	
FENOTHIOCARB	X	X
FENOXAPROP-P	X	
FENOXAPROP-P-ETHYL	X	X
FENOXYCARB	X	X

Active substance	Laboratory	
	Greit	Lufa
FENPICLONIL		X
FENPROPATHRIN	X	X
FENPROPIDIN (sum of fenpropidin and it's salts expressed as fenpropidin)	X	
FENPROPIMORPH	X	X
FENPYRAZAMINE	X	
FENPYROXIMATE	X	X
FENSON	X	
FENTHION	X	X
FENTHION OXON	X	X
FENTHION OXON SULFONE	X	X
FENTHION OXON SULFOXIDE	X	X
FENTHION SULFONE	X	X
FENTHION SULFOXIDE	X	
FENURON	X	X
FENVALERATE	X	
FIPRONIL	X	X
FIPRONIL (sum of fipronil and metabolite solfone expressed as fipronil)	X	
FIPRONIL-SULFOXID		X
FIPRONIL SULFONE	X	X
FLAMPROP-ISOPROPYL	X	
FLAZASULFURON	X	
FLONICAMID	X	X
FLONICAMID (sum of Flonicamid, TFNG and TFNA expressed as Flonicamid)	X	
FLORASULAM	X	
FLUAZIFOP	X	
FLUAZIFOP-P (sum of all isomers ofl fluazifop expressed as fluazifop)	X	
FLUAZIFOP-P-BUTYL	X	X
FLUAZINAM	X	
FLUBENDIAMIDE	X	X
FLUCHLORALIN		X
FLUBENZIMINE	X	
FLUCYCLOXURON	X	
FLUCYTHRINATE	X	X
FLUDIOXONIL	X	X
FLUFENACET (sum of all compounds containing the fraction N fluorofenil-N-isopropil expressed as flufenacet)	X	X
FLUFENOXURON	X	X
FLUMETRALIN		X
FLUMIOXAZIN		X
FLUOXASTROBIN		X
FLUOPICOLIDE	X	X
FLUOPYRAM	X	X
FLUQUINCONAZOLE	X	X
FLUROCHLORIDONE	X	X

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Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
FLUROXYPYR	X	
FLUROXYPYR (sum of fluroxypyr and it's salts expressed as fluoroxypyr)	X	
FLUROXYPYR-1-METHYLHEPTYLESTER	X	X
FLURPRIMIDOL		X
FLURTAMON		X
FLUTHIACET-METHYL		X
FLUSILAZOLE	X	X
FLUTOLANIL	X	X
FLUTRIAFOL	X	X
FLUXAPYROXAD	X	
FOLPET	X	X
FONOFOS	X	X
FORAMSULFURON	X	
FORCHLORFENURON	X	
FORMETANATE (sum of formetanate and it's salts expressed as formetanate-HCl)	X	X
FORMOTHION	X	X
FOSTHIAZATE	X	X
FUBERIDAZOLE	X	X
FURALAXYL	X	X
FURATHIOCARB	X	X
HALFENPROX		X
GIBBERELLIC ACID	X	
HALOXYFOP	X	
HALOXYFOP-METHYL	X	X
HEPTACHLOR	X	X
HEPTACHLOR (sum of heptachlor and heptachlorepoxide expressed as heptachlor)	X	X
HEPTACHLOR-ENDO- EPOXIDE	X	
HEPTACHLOR-EXO- EPOXIDE	X	
HEPTENOPHOS	X	X
HEXACHLOROBENZENE	X	X
HEXACHLOROCICLOHEXANE (HCH, sum of it's isomers except the isomer gamma)	X	
HEXACONAZOLE	X	X
HEXAZINON		X
HEXAFLUMURON	X	
HEXYTHIAZOX	X	X
IMAZALIL	X	X
IMIBENCONAZOL		X
IMAZAMETHABENZ-METHYL	X	
IMAZAMOX (sum of imazamox and it's salts, expressed as imazamox)	X	
IMIDACLOPRID	X	X
INDOXACARB (sum of indoxacarb and it's enantiomero R)	X	X
IODOFENPHOS	X	X
IODOSULFURON-METHYL (sum of iodosulfuron-methyl and it's salts, expressed as iodosulfuron-methyl)	X	X
IOXYNIL (sum of Ioxynil and it's salts, expressed as ioxynil)	X	
IPRODIONE	X	X
IPROVALICARB	X	X
ISOCARBOPHOS		X
ISODRIN		X
ISOPROTHIOLAN		X
ISOFENPHOS	X	X
ISOFENPHOS METHYL	X	X
ISOPROCARB	X	
ISOPROPALIN	X	
ISOPROTURON	X	X
ISOPYRAZAM	X	
ISOXABEN	X	X
ISOXADIFEN-ETHYL		X
ISOXAFLUTOLE (sum of isoxaflutole and it's metabolite dichetonitrile, expressed as isoxaflutole)	X	X
KRESOXYM METHYL	X	X
LAMBDA-CYHALOTHRIN	X	X
LENACIL	X	
LINDANE (isomer gamma of hexachlorociclohexan)	X	X
LINURON	X	X
LUFENURON	X	X
MALAOXON	X	X
MALATHION	X	X
MALATHION (sum of malathion and malaoxon expressed as malathion)	X	
MANDIPROPAMID	X	X
MCPA	X	
MCPA and MCPB (MCPA, MCPB included their salts expressed as MCPA)	X	
MCPB	X	
MECARBAM	X	X
MECOPROP (sum of mecoprop-P and mecoprop, expressed as mecoprop)	X	
MEFENPYR-DIETHYL	X	X
MEPANIPYRIM	X	X
MEPRONIL	X	X
MEPTYLDINOCAP (sum of 2,4 DNOPC and 2,4 DNOP expressed as meptyldinocap)	X	
METAFLUMIZONE (sum of isomers E- and Z-)	X	X
METALAXYL AND METALAXYL-M	X	X
METAMITRON	X	X
METAZACHLOR	X	X
METCONAZOLE (sum of isomers)	X	X

Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
METHABENZTHIAZURON	X	X
METHACRIFOS	X	X
METHAMIDOPHOS	X	X
METHIDATHION	X	X
METHIOCARB	X	X
METHIOCARB (sum of Methiocarb, Methiocarb Sulfone and Sulfoxide expressed as Methiocarb)	X	
METHIOCARB SULFONE	X	
METHIOCARB SULFOXIDE	X	
METHOLACHLOR AND METHOLACHLOR-S	X	X
METHOMYL	X	X
METHOMYL AND THIODICARB (sum of methomyl and thiodicarb expressed as methomyl)	X	
METHOPRENE	X	
METHOXYCHLOR	X	X
METHOXYFENOZIDE	X	X
METOBROMURON	X	X
METOSULAM	X	
METOLCARB		X
METOXURON	X	X
METRAFENONE	X	X
METRIBUZIN	X	X
METSULFURON-METHYL	X	
MEVINPHOS (sum of the isomers E e Z)	X	X
MILBEMECTIN (sum of milbemycin A4 and milbemycin A3, expressed as milbemectin)	X	
MILBEMYCIN A3	X	
MILBEMYCIN A4	X	
MIREX	X	X
MONURON		X
MOLINATE	X	X
MONOCROTOPHOS	X	
MONOLINURON	X	
MYCLOBUTANYL	X	X
N-(2,4-DIMETHYL-PHENYL)-FORMAMIDE (DMF)	X	
N-2,4-DIMETHYLPHENYL-N-METHYLFORMAMIDINE (DMPF)	X	
NAA (1-naphthylacetic acid)	X	
NAD (1-Naphthylacetamide)	X	
NAD e NAA (sum of NAD and NAA and their salt's, expressed as NAA)	X	
NAPROPAMIDE	X	X
NAPTALAM	X	
NEBURON	X	X
NICOSULFURON	X	
NITENPYRAM	X	X
NITRAPYRIN		X
NITROFEN	X	X
NITROTHAL-ISOPROPYL	X	

Active substance	Laboratory	
	Greit	Lufa
NORFLURAZON		X
NOVALURON	X	X
NUARIMOL	X	X
OFURACE		X
o,p´-DDE	X	
o,p´-DDT	X	
o,p´-TDE (DDD)	X	
OMETHOATE	X	X
ORTHO-PHENYLPHENOL		X
OXADIAZON	X	X
OXADIXYL	X	X
OXAMYL	X	X
OXYCHLORDAN		X
OXYDEMETON-METHYL	X	
OXYDEMETON-METHYL (sum of oxydemeton-methyl and demeton-S-methylsulfone expressed as oxydemeton-methyl)	X	X
OXYFLUORFEN	X	X
p,p´-DDE	X	
p,p´-DDT	X	
p,p´-TDE (DDD)	X	
PACLOBUTRAZOL	X	
PARAOXON	X	X
PARAOXON METHYL	X	X
PARATHION	X	X
PARATHION METHYL (sum of parathion-methyl and paraoxon-methyl expressed as parathion methyl)	X	X
PEBULAT		X
PARATHION-METHYL	X	
PENCONAZOLE	X	X
PENCYCURON	X	X
PENDIMETHALIN	X	X
PENTACHLOROANISOLE	X	X
PENTACHLOROANILIN		X
PENTHIOPYRAD	X	
PERMETHRIN (sum of isomers)	X	X
PERTHANE	X	
PETHOXAMID	X	X
PHENMEDIPHAM	X	X
PHENTHOATE	X	X
PHORATE	X	X
PHOSFOLAN		X
PHOSALONE	X	
PHOSMET	X	X
PHOSMET (sum of Phosmet and Phosmet-Oxon expressed as Phosmet)	X	X
PHOSMET-OXON	X	
PHOSPHAMIDON	X	

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Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
PHOXIM	X	
PHTALIMIDE (Folpet Metabolite)	X	X
PICARIDIN		X
PICOLINAFEN		X
PICLORAM	X	
PICOXYSTROBIN	X	X
PINOXADEN	X	X
PIPERONYL BUTOXIDE	X	X
PIRIMICARB	X	X
PIRIMICARB-DESMETHYL	X	X
PIRIMICARB-DESMETHYL-FORMAMIDO	X	
PIRIMIPHOS ETHYL	X	X
PIRIMIPHOS METHYL	X	X
PLIFENAT		X
PROCHLORAZ	X	X
PROCYMIDONE	X	X
PROFENOFOS	X	X
PROFLURALIN	X	X
PROHEXADIONE (prohexadione (acid) and it's salts expressed as prohexadione-calcio)	X	
PROMECARB	X	X
PROMETHRIN	X	
PROMETON	X	X
PROMETRYN		X
PROPACHLOR	X	X
PROPAMOCARB (sum of propamocarb and it's salts expressed as propamocarb)	X	
PROPANIL	X	
PROPAQUIZAFOP	X	X
PROPARGITE	X	X
PROPAZINE	X	X
PROPETAMPHOS		X
PROPHAM	X	X
PROPICONAZOLE (sum of isomers)	X	X
PROPISOCHLOR	X	
PROPOXUR	X	X
PROPYZAMIDE	X	X
PROQUINAZID	X	X
PROSULFOCARB	X	X
PROSULFURON	X	X
PROTHIOCONAZOLE	X	X
PROTHIOCONAZOLE-DESTHIO	X	
PROTHIOFOS	X	X
PYMETROZINE	X	
PYRACLOSTROBIN	X	X
PYRAFLUFEN-ETHYL (sum of pyraflufen-ethyl and pyraflufen, expressed as pyraflufen-ethyl)	X	X
PYRAZOPHOS	X	X
PYRETHRINS	X	X
PYRIDABEN	X	X
PYRIDAFOL	X	
PYRIDAPHENTHION	X	X
PYRIDATE	X	
PYRIDATE (sum of pyridate and it's product if hydrolisis CL 9673 (6-cloro-4-idrossi-3-fenilpiri-dazina), expressed as pyridate)	X	
PYRIFENOX	X	X
PYRIMETHANIL	X	X
PYRIPROXYFEN	X	X
QUINALPHOS	X	X
QINOCLAMIN		X
QUINMERAC	X	
QUINOXYFEN	X	X
QUINTOZENE (sum of quintozene and penta-chloroaniline, expressed as quintozene)	X	X
QUIZALOFOP, incl. QUIZALOFOP-P	X	
QUIZALOFOP-P-ETHYL	X	X
RESMETHRIN (sum of isomers)	X	
RIMSULFURON	X	
ROTENONE	X	X
SILAFLUOFEN		X
SILTHIOFAM		X
SIMAZINE	X	X
SAFLUFENACIL (sum of saflufenacil, M800H11 and M800H35, expressed as saflufenacil)	X	
SETHOXYDIM	X	
SIMETRYN	X	
SPINETORAM	X	
SPINOSAD (sum of spinosyn A and spynosin D expressed as spinosad)	X	
SPIRODICLOFEN	X	X
SPIROMESIFEN	X	X
SPIROTETRAMAT	X	X
SPIROTETRAMAT and it's 4 METABOLITES BYI08330-ENOL, BYI08330-KETOHYDROXY, BYI08330-MONOHYDROXY, and BYI08330 ENOL-GLUCOSIDE, ecpressed as SPIROTETRAMAT	X	
SPIROXAMINE (sum of isomers)	X	
SPYNOSYN A	X	X
SPYNOSYN D	X	
SULFOTEP	X	X
SULPROFOS	X	X
TAU-FLUVALINATE	X	X
TEBUCONAZOLE	X	X
TEBUFENOZIDE	X	X
TEBUFENPYRAD	X	X
TEBUTAM		X

Table S7. Continued.

Active substance	Laboratory	
	Greit	Lufa
TECNAZENE	X	X
TEFLUBENZURON	X	X
TEFLUTHRIN	X	X
TEPRALOXYDIM	X	
TERBUFOS	X	X
TERBUMETON	X	X
TERBUTHYLAZINE	X	X
TERBUTHYLAZINE-2-HYDROXY	X	
TERBUTHYLAZINE-DESETHYL	X	
TERBUTRYN	X	X
TETRACHLORVINPHOS	X	X
TETRACONAZOLE	X	X
TETRADIFON	X	X
TETRAHYDROPHTALIMIDE (Captan Metabolite)	X	X
TETRAMETHRIN	X	X
TFNA	X	
TFNG	X	
THIABENDAZOLE	X	X
THIACLOPRID	X	X
THIAMETOXAM	X	X
THIFENSULFURON-METHYL	X	
THIOBENCARB (4-chlorobenzyl methyl sulfone)	X	X
THIOCYCLAM	X	X
THIODICARB	X	X
THIOMETON	X	
THIONAZIN	X	
THIOPHANATE-METHYL	X	
TOLCLOFOS-METHYL	X	X
TOLFENPYRAD		X
TOLYLFLUANID	X	
TOLYLFLUANID (sum of tolylfluanid and dimethyl-aminosulfotoluidide expressed as tolylfluanid)	X	X
TRALOMETHRIN	X	X
TRI-ALLAT	X	X
TRIADIMEFON	X	X
TRIADIMENOL	X	X
TRIADIMENOL and TRIADIMEFON (sum)	X	
TRIASULFURON	X	
TRIAZAMATE	X	
TRIAZOPHOS	X	X
TRICYCLAZOL		X
TRIBENURON-METHYL	X	
TRICHLORFON	X	
TRICLOPYR	X	
TRIFLOXYSTROBIN	X	X
TRIFLUMIZOLE	X	X
TRIFLUMIZOLE (triflumizole and metabolite FM-6-1(N-(4-cloro-2-trifluorometilfenil-n-propoxy-acetamidine), expressed as triflumizole)	X	
TRIFLUMIZOLE-AMINO	X	
TRIFLUMURON	X	
TRIFLURALIN	X	X
TRIFLUSULFURON-METHYL	X	
TRIFORINE	X	X
TRINEXAPAC (sum of trinexapac (acid) and it's salts, expressed as trinexapac)	X	
TRITICONAZOLE	X	X
UNICONAZOL		X
VALIFENALATE	X	
VAMIDOTHION	X	X
VINCLOZOLIN	X	X
ZOXAMIDE	X	X

Conflicts of interest statement

The authors declare that they do not have any conflicts of interest.

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