NUMERICAL DATA

An integrated assessment and spatial-temporal variation analysis of neonicotinoids in pollen and honey from noncrop plants in Zhejiang, China (2019)

Temporal distributions of total neonicotinoids (ng/g, expressed as IMIRPF) in pollen and honey samples collected from 12 study stations in Zhejiang China.

Sample	Month	Total IMI_{RPF}												
		Yunhe	Fotang	Pujiang	Wuyi	Wenzhou	Pinghu	Cixi	Tonglu	Lin'an	Zhuji	Deqing	Taizhou	**Mean**
Pollen	April	0.13	0.15	/	34.93	0.88	10.89	2.33	12.29	0.08	/	1.35	/	**5.24**
	May	1.20	1.10	4.46	0.86	0.47	0.56	0.38	1.78	12.85	3.10	1.60	/	**2.36**
	June	0.04	0.14	2.72	20.14	2.05	3.29	/	5.26	/	/	1.35	/	**2.95**
	Mean	0.46	0.46	2.40	18.64	1.13	4.91	0.90	6.45	4.31	1.03	1.43	/	**3.52**
Honey	April	/	/	/	/	8.51	/	0.002	/	0.08	/	/	/	**2.86**
	May	/	/	/	/	/	/	0.55	/	/	/	/	/	**0.18**
	Mean	/	/	/	/	**4.25**	/	**0.28**	/	**0.04**	/	/	/	**1.52**

Table shows IMIRPF levels in pollen samples ranging from ND to 34.93 ng/g. Relatively high IMIRPF levels were observed in Wuyi (34.93 ng/g in April; 20.14 ng/g in June), Lin'an (12.85 ng/g) in May, Tonglu (12.29 ng/g) in April and Pinghu (10.89 ng/g) in April. For honey samples, the peak value of IMIRPF (8.51 ng/g) was found in Wenzhou in April and was several magnitudes higher than that in Cixi (0.002 ng/g).

Source: http://agri.ckcest.cn/file1/M00/06/88/Csgk0F0jAsSAN6gZABw5oUWdbAE318.pdf

Simultaneous removal of neonicotinoid insecticides by a microbial degrading consortium: Detoxification at reactor scale (2019)

Residual concentration of neonicotinoids in liquid phase removal assays with different bacterial consortia. Assay 1 included all consortia in simultaneous and individual pesticide elimination; significant elimination values with respect to the uninoculated control are bolded. Assay 2 included only degrading consortia during individual pesticide elimination.

Consortium	**Assay 1: Residual pesticide after**		**Assay 2: Residual pesticide after**			
	31 d (% of initial concentration)		**14 d (% of initial concentration)**			
	Imidacloprid	Thiamethoxam	Imidacloprid		**Acetamiprid**	
			BH-N	TSB	BH-N	**TSB**
Uninoculated control	75.2 (73.1)	72.4 (71.6)	58.8	70.8	71.0	**94.7**
C1	72.7 (76.0)	75.7 (77.0)	e	e		
N1	30.0 (30.8)	48.2 (67.7)	39.6	53.1	58.8	**73.0**
CN1	78.8 (76.5)	76.9 (75.7)	e	e		
C2	78.2 (82.0)	77.5 (77.1)	e	e		
N2	3.8 (8.3)	76.9 (76.5)	40.4	607	57.8	**69.3**
CN2	**75.3 (79.0)**	**77.2 (75.2)**	**e**	**e**		

[a] C, consortia from BH-C; N, consortia from BH-N; CN, consortia from BH-CN; numbers 1 and 2 refer to the different soil samples used as inoculum.

[b] Values correspond to individual removal; values in parenthesis correspond to simultaneous treatment of both insecticides.

[c] Culture media: BH-N, Bushnell-Haas lacking N source; TSB, trypticase soy broth.

Neonicotinoid degradation was more efficiently achieved in this study by consortium N1 at reactor-scale than at flask-scale. Conditions in the reactor, including forced aeration and better oxygen mass transfer could favor the accelerated pesticide elimination. The reactor performance also surpassed the efficiency observed in several studies that employed isolated strains at flask- scale.

Source: https://www.sciencedirect.com/science/article/pii/S0045653519314845

Sorption, desorption and degradation of neonicotinoids in four agricultural soils and their effects on soil microorganisms. (2018)

Table 1: Freundlich model of sorption-desorption isotherms of three neonicotinoids on four soils.

Sorption		**Freundlich isotherm parameters**			**K_d[b]**		
Chemicals	Soils	n	K_f[a]	R^2	C_e = 0.05	C_e = 0.5	C_e = 5
IMI	BS	0.862 ± 0.019	3.42 ± 0.106	0.997	5.17	3.76	2.74
	FS	0.987 ± 0.097	2.36 ± 0.399	0.953	2.45	2.38	2.31
	PS	0.805 ± 0.059	2.62 ± 0.264	0.969	4.70	3.00	1.91
	RS	1.02 ± 0.031	1.01 ± 0.054	0.994	0.901	0.991	1.08
CLO	BS	0.853 ± 0.041	3.39 ± 0.230	0.986	5.25	3.75	2.67
	FS	0.991 ± 0.011	1.08 ± 0.020	0.996	1.10	1.08	1.06
	PS	0.779 ± 0.070	2.75 ± 0.328	0.956	5.03	3.17	1.99
	RS	0.998 ± 0.016	0.992 ± 0.059	0.975	1.02	1.00	0.992
THI	BS	0.806 ± 0.011	9.06 ± 0.156	0.998	16.2	10.4	6.63
	FS	0.842 ± 0.023	3.40 ± 0.127	0.995	5.46	3.79	2.64
	PS	0.719 ± 0.022	4.70 ± 0.184	0.994	10.9	5.71	2.99
	RS	0.984 ± 0.024	1.16 ± 0.049	0.996	1.32	1.28	1.23
Desorption		**Freundlich isotherm parameters**			**HI**		
Chemicals	Soils	n[d]	K_f[d]	R^2	C_e = 0.05	C_e = 0.5	C_e = 5
IMI	BS	0.725 ± 0.048	3.76 ± 0.251	0.975	0.785	0.350	0.021
	FS	0.919 ± 0.091	3.27 ± 0.400	0.953	0.699	0.455	0.245
	PS	0.650 ± 0.057	3.50 ± 0.020	0.963	1.13	0.489	0.041
	RS	1.02 ± 0.116	1.20 ± 0.203	0.927	0.268	0.202	0.139
CLO	BS	0.723 ± 0.051	5.05 ± 0.038	0.971	1.21	0.633	0.209
	FS	0.977 ± 0.054	1.86 ± 0.157	0.982	0.807	0.748	0.692
	PS	0.594 ± 0.055	4.04 ± 0.035	0.951	1.70	0.688	0.055
	RS	0.921 ± 0.059	1.32 ± 0.209	0.976	0.638	0.391	0.181
THI	BS	0.717 ± 0.033	10.9 ± 0.566	0.987	0.568	0.276	0.038
	FS	0.770 ± 0.041	4.28 ± 0.240	0.984	0.562	0.324	0.122
	PS	0.645 ± 0.057	5.49 ± 0.555	0.955	0.458	0.230	0.039
	RS	0.943 ± 0.035	1.55 ± 0.086	0.989	0.387	0.263	0.150

Source: https://www.sciencedirect.com/science/article/pii/S0048969717324397

Sorption, desorption and degradation of neonicotinoids in four agricultural soils and their effects on soil microorganisms (2018)

Table 1: Degradation of three neonicotinoids in four soils during 60 days of incubation.

Chemicals	Soils		k (day^{-1})	R^2	$t_{1/2}$ (days)	Removal rate (%)	
IMI	BS	sterilized	0.0128 ± 0.0020	0.967	54.1	54.7	± 1.62d
		non-sterilized	0.0193 ± 0.0016	0.977	35.9	67.1	± 1.93c
	FS	sterilized	0.0078 ± 0.0009	0.895	88.6	36.4	± 1.74hi
		non-sterilized	0.0115 ± 0.0009	0.967	60.5	46.1	± 1.54ef
	PS	sterilized	0.0060 ± 0.0003	0.914	115	29.6	± 1.10jk
		non-sterilized	0.0089 ± 0.0013	0.9045	77.6	42.3	± 1.15fg
	RS	sterilized	0.0049 ± 0.0018	0.855	130	25.5	± 2.41k
		non-sterilized	0.0074 ± 0.0021	0.849	86.7	35.3	± 1.76hi
CLO	BS	sterilized	0.0074 ± 0.0007	0.895	93.2	39.6	± 1.69gh
		non-sterilized	0.0148 ± 0.0016	0.954	47.0	57.6	± 2.36d
	FS	sterilized	0.0072 ± 0.0009	0.932	96.1	32.3	± 1.72ij
		non-sterilized	0.0118 ± 0.0020	0.882	58.8	46.3	± 0.69ef
	PS	sterilized	0.0063 ± 0.0015	0.909	110	27.6	± 1.77jk
		non-sterilized	0.0132 ± 0.0024	0.868	52.4	53.4	± 1.73d
	RS	sterilized	0.0055 ± 0.0009	0.875	126	27.3	± 1.16k
		non-sterilized	0.0088 ± 0.0016	0.862	79.0	45.6	± 1.82ef
S	BS	sterilized	0.0169 ± 0.0015	0.968	55.0	56.5	± 1.19d
		non-sterilized	0.0440 ± 0.0059	0967	25.7	80.9	± 2.50a
	FS	sterilized	0.0115 ± 0.0012	0.955	60.2	47.3	± 1.23e
		non-sterilized	0.0236 ± 0.0013	0.991	29.3	74.5	± 1.18b
	PS	sterilized	0.0101 ± 0.0009	0.958	68.4	29.5	± 2.87jk
		non-sterilized	0.0195 ± 0.0017	0.975	35.6	56.3	± 1.16d
	RS	sterilized	0.0095 ± 0.0007	0.976	73.1	25.4	± 1.76k
		non-sterilized	0.0155 ± 0.0011	0.979	44.7	35.3	± 2.29hi

Source: https://www.sciencedirect.com/science/article/pii/S0048969717324397

Neonicotinoid residues in UK honey despite European Union moratorium (2017)

Table 1: PGP Summary of neonicotinoids residues found in honey pre- and post the EU moratorium.

Date	Number of honey	Average combined NNI residue (ng g-1 w/w)	Maximum combined NNI residue (ng g-1 w/w)	Median combined NNI residue (ng g-1 w/w)	Proportion of honey containing neonicotinoids residues above LOD (0.38 ng g-1 w/w)			
					NN	*TMX*	*CTD*	*IMI*
2014(all)	21	0.43 (SE = 0.12)	2.00	0.38	0.52	0.14	0.38	0.10
2015(all)	109	0.19 (SE = 0.04)	1.99	0.00	0.2 3	00.16 0.0 7	0.17 6	0.06
May-15	12	0.62 (SE = 0.21)	1.79	0.62	0.66	0.25	0.50	0.08
Jun-15	12	0.40 (SE = 0.19)	1.99	0.00	0.33	0.00	0.33	0.08
Jul-15	16	0.26 (SE = 0.10)	1.10	0.00	0.38	0.13	0.25	0.13
Aug-15	46	0.07 (SE = 0.03)	0.76	0.00	0.13	0.04	0.09	0.02
Sep-15	23	0.02 (SE = 0.02)	0.38	0.00	0.04	0.00	0.00	0.04

Summary statistics for the combined (NNI) residues of thiamethoxam (TMX), clothianidin (CTD and imidacloprid found within honey pre- (2014) and post (2015) the implementation of the EU moratorium on their use in mass flowering crops. Seasonal changes in residues post moratorium are also shown. Note that residues of more than one neonicotinoid compound may be found in the same sample of honey.

Source: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0189681

Reduction of neonicotinoid insecticide residues in Prairie wetlands by common wetland plants (2017)

		Detection (%)			Clothianidin (µg/L)		Thiamethoxam (µg/L)		Imidacloprid (µg/L)		TEQ - Imidacloprid (µg/L)	
Wetland type	Week	CLO	THX	IMI	Mean ± S.E.	Max.	Mean ± S.E.	Max.	Mean ± S.E.	Max.	Mean ± S.E.	Max.
Unvegetated	1	90	30	ND	0.016 ± 0.003	0.035	0.005 ± 0.003	0.026	ND	ND	0.025 ± 0.005	0.057
n = 10	4	90	30	30	0.011 ± 0.003	0.029	0.002 ± 0.001	0.006	0.001 ± 0.001	0.005	0.028 ± 0.005	0.054
	6	80	40	10	0.018 ± 0.004	0.037	0.080 ± 0.049	0.425	0.000 ± 0.000	0.003	0.030 ± 0.007	0.064
	8	80	20	ND	0.008 ± 0.003	0.035	0.005 ± 0.004	0.040	ND	ND	0.013 ± 0.005	0.056
Vegetated	1	90	20	10	0.013 ± 0.002	0.022	0.001 ± 0.001	0.007	0.000 ± 0.000	0.004	0.021 ± 0.003	0.036
n = 10	4	50	20	ND	0.003 ± 0.001	0.011	0.001 ± 0.001	0.006	ND	ND	0.005 ± 0.002	0.018
	6	50	10	40	0.006 ± 0.002	0.013	0.004 ± 0.004	0.041	0.002 ± 0.001	0.007	0.012 ± 0.003	0.023
	8	50	10	20	0.004 ± 0.002	0.013	0.005 ± 0.005	0.047	0.001 ± 0.000	0.003	0.007 ± 0.002	0.021

ND = no detection.

Summary of percent detections, arithmetic means (±SE), and maximum concentrations of neonicotinoids (clothianidin, imidacloprid, thiamethoxam) in water from wetlands situated in clothianidin-treated canola fields. Percent detections are calculated from values NLOQ only. Concentration values are reported in µg/L and presented as overall summaries by week for each wetland type: unvegetated or vegetated. Toxic equivalency (TEQ- Imidacloprid) (see Cavallaro et al., 2016) is calculated to represent the toxic potential of the water samples to sensitive aquatic insect larvae from combined neonicotinoid exposure relative to imidacloprid.

Source: https://doi.org/10.1016/j.scitotenv.2016.11.102

Strain specific discriminating concentration results (i.e. per cent susceptible) for 24 strains of Aphis gossypii collected from Australian cotton and tested against a discriminating concentration of 0.002 g/L acetamiprid, 0.02 g/L thiamethoxam and 0.05 g/L clothianidin(2016)

Strain	Location	Acetamiprid (%)	Thiamethoxam (%)	Clothianidin (%)
The Ovr 08	Darling Downs	100	100	100
Ros R2	Darling Downs	100	80	93
Brook	St George	100	100	100
War F1	Namoi Valley	100	100	100
W Lag V	Namoi Valley	76	86	95
Elra	Darling Downs	82	44	99
Bin	Gwydir Valley	77	57	89
The My	Namoi Valley	100	100	91
Kat Vol	St George	74	70	80
St R	Darling Downs	49	42	98
Kat S	St George	76	73	70
The Ovr 09	Darling Downs	100	98	100
Cav	Darling Downs	100	72	90
Ros R9	Darling Downs	100	66	86
Tull	Namoi Valley	92	71	98
Wam	Darling Downs	98	100	91
War Vol	Namoi Valley	100	100	100
Bal	St George	92	100	100
Nar	Darling Downs	91	80	50
Went F6	Namoi Valley	97	100	100
W Lag F5	Namoi Valley	98	98	95
Yar	Namoi Valley	99	100	98
Fair	Darling Downs	87	100	100
EWer	Darling Downs	94	36	80

Source: Lewis J Wilson at al.(2016), Neonicotinoid resistance in Aphis gossypii Glover (Aphididae: Hemiptera) from Australian cotton, Australian Journal of Entomology

Full log dose probit regression summary for the three strains of Aphis gossypii with the highest proportion of discriminating concentration survivors for each neonicotinoid chemical tested(2016)

Chemical	Strain	Slope (± SE)	LC50 (95% FL) (g/L)	RF (95% CI)
Acetamiprid	Susceptible	2.8 (±0.26)	0.00017(0.00012–0.00021)	–
	Kat Vol	2.0 (±0.37)	0.0011 (0.00062–0.0017)	6.4 (3.8–10.6)
	St R	1.4 (±0.25)	0.00051 (0.00023–0.00084)	3.1 (1.7–5.6)
	Kat S	1.6 (±0.21)	0.00020 (0.00011–0.00030)	1.2 (0.7–2.1)
Thiamethoxam	Susceptible	1.7 (±0.42)	0.00045 (0.00014–0.00079)	–
	Elra	1.3 (±0.20)	0.010 (0.0043–0.017)	22 (9.5–53)
	St R	1.2 (±0.10)	0.0077 (0.0048–0.011)	17 (8.3–36)
	EWer	0.9 (±0.26)	0.0017 (0.000017–0.0067)	3.9 (0.6–24)
Clothianidin	Susceptible	2.3 (±0.44)	0.0012 (0.00078–0.0018)	–
	Kat S	1.1 (±0.17)	0.0074 (0.0032–0.012)	5.9 (2.9–12)
	Nar	0.8 (±0.27)	0.013 (0.00027–0.054)	10 (1.8–56)
	EWer	0.9 (±0.15)	0.0024 (0.0011–0.0043)	1.9 (1.0–4.0)

Source: Grant A Herron at al.(2016), Neonicotinoid resistance in Aphis gossypii Glover (Aphididae: Hemiptera) from Australian cotton, Australian Journal of Entomology