

Supplementary data for:

Methodological aspects for the implementation of the Air Pesticide Control and Surveillance Network (PESTNet) of the Valencian Region (Spain)

Antonio López ¹, Pablo Ruiz ², Vicent Yusà ^{1, 2, 3}, Clara Coscollà ^{1*}

¹ Foundation for the Promotion of Health and Biomedical Research in the Valencia Region, FISABIO-Public Health, 21, Avenida Catalunya, 46020, Valencia, Spain

² Public Health Laboratory of Valencia, 21, Avenida Catalunya, 46020 Valencia, Spain

³ Analytical Chemistry Department, University of Valencia, Edifici Jeroni Muñoz, Dr. Moliner 50, 46100 Burjassot, Spain

Keywords: Pesticides, network, public health, ambient air, surveillance.

*Corresponding author. Tel.: +34 961926333; fax: +34 961925704.

E-mail addresses: coscolla_cla@gva.es (C.Coscollà)

Table of Contents

Type	Captions	Page
Table S-1	Initial list of selected pesticide	3
Table S-2	Description of the sampling sites	5
Table S-3	Spatial distribution of the detected pesticides in the evaluated stations	6
Table S-4	Obtained Hazard Quotient using average concentrations and maximum concentrations for adults (> 12 years)	7
Table S-5	Obtained Hazard Quotient using average concentrations and maximum concentrations for children (1-6 years)	8
Table S-6	Obtained Hazard Quotient using average concentrations and maximum concentrations for infants (6 months-1.5 years)	9
Table S-7	Cumulative exposure (using maximum concentrations)	10
Table S-8	Cancer risk of potential carcinogenic pesticides (using maximum concentrations)	10

Table S-1. Initial list of selected pesticide.

Pesticide	Status*	Pesticide	Status*	Pesticide	Status*
2,4-D	In	Chlorotoluron	In	Ethoprophos	In
2-phenylphenol	In	Chlorpropham	Out	Etofenprox	Out
Abamectin	In	Chlorpyrifos-ethyl	Out	Etoxazole	In
Acephate	Out	Chlorpyrifos-methyl	Out	Famoxadone	In
Acetamiprid	In	Clofentezine	In	Fenazaquin	In
Acrinathrin	In	Clothianidin	Out	Fenbuconazole	In
Aldrin	Out	Copper compounds	In	Fenhexamid	In
Alpha-cypermethrin	In	Cyazofamid	In	Fenitrothion	Out
Ametoctradin	In	Cyflufenamid	In	Fenoxy carb	In
Amisulbrom	In	Cyfluthrin	Out	Fenpyrazamine	In
Atrazine	Out	Cymoxanil	In	Fenpyroximate	In
Azadirachtin	In	Cypermethrin	In	Fipronil	Out
Azoxystrobin	In	Cyproconazole	In	Flonicamid	In
Benalaxyl	Out	Cyprodinil	In	Fluazifop	Out
Benalaxyl-M	In	Deltamethrin	In	Flubendiamide	In
Bendiocarb	Out	Diazinon	Out	Fludioxonil	In
Bensulfuron	In	Dichlorvos	Out	Flufenoxuron	Out
Bentazone	In	Diclofop	In	Fluopicolide	In
Benthiavalicarb	In	Dieldrin	Out	Fluopyram	In
Beta-cyfluthrin	In	Diethofencarb	In	Fluquinconazole	In
Beta-HCH	Out	Difenconazole	In	Fluroxypyr	In
Bifenthrin	Out	Diflubenzuron	Out	Flutolanil	In
Bitertanol	Out	Dimethoate	Out	Flutriafol	In
Boscalid	In	Dimethomorph	In	Flusilazole	Out
Bromacil	Out	Dioxacarb	Out	Folpet	In
Bromopropylate	Out	Diphenylamine	Out	Fosetyl-Al	In
Bupirimate	In	Diquat	Out	Gibberellic acid	In
Buprofezin	In	Dithianon	In	Glyphosate	In
Captan	In	Dithiofencarb	In	Hexythiazox	In
Carbendazim	Out	Diuron	Out	Imazalil	In
Carbofuran	Out	Dodine	In	Imidacloprid	Out
Carbosulfam	Out	Emamectin	In	Indoxacarb	In
Chlorantraniliprole	In	Endosulfan	Out	Iprodione	Out
Chlorates	Out	Endothal	Out	Iprovalicarb	In

Pesticide	Status*	Pesticide	Status*	Pesticide	Status*
Chlorothalonil	Out	Ethirimol	Out	Isoproturon	Out
Kresoxim-methyl	In	Pendimethalin	In	Spiroxamine	In
Lambda-cyhalothrin	In	Penoxsulam	In	tau-Fluvalinate	In
Laminarim	In	Permethrin	Out	Tebuconazole	In
Lindane	Out	Phosmet	In	Tebufenozide	In
Linuron	Out	Picoxystrobin	Out	Tebufenpyrad	In
Lufenuron	Out	Pirimicarb	In	Teflubenzuron	Out
Malathion	In	Pirimicarb-desmethyl	In	Terbumeton	Out
Maleic hydrazide	In	Pirimiphos-methyl	Out	Terbutylazine	In
Mancozeb	Out	Prochloraz	In	Terbutylazine-2-OH	In
Mandipropamid	In	Prohexadione	In	Terbutylazine-desethyl	In
Maneb	Out	Prometryn	Out	Tetraconazole	In
MCPA	In	Propamocarb	In	Thiabendazole	In
Mepanipyrim	In	Propanil	Out	Thiaclorpid	Out
Meptyldinocap	In	Propargite	Out	Thiamethoxam	Out
Metaflumizone	In	Propiconazole	Out	Thiophanate-methyl	Out
Metalaxyl	In	Propineb	Out	Thiram	Out
Metalaxyl-M	In	Proquinazid	In	Tolclofos-methyl	In
Methidathion	Out	Pymetrozine	Out	Triadimefon	Out
Methiocarb	Out	Pyraclostrobin	In	Triadimenol	Out
Methiram	In	Pyridaben	In	Tricyclazole	Out
Methoxyfenozide	In	Pyrimethanil	In	Trifloxystrobin	In
Metolachlor	Out	Pyriproxyfen	In	Trifluralin	Out
Metrafenone	In	Pyroquilon	Out	Valifenalate	In
Milbemectin	In	Quinoxyfen	Out	Vinclozolin	Out
Molinate	Out	Rescalure	In	Ziram	In
Myclobutanil	In	Spinetoram	In		
Omethoate	Out	Spinosad	In		
Oxyfluorfen	In	Spirodiclofen	Out		
Paclobutrazol	In	Spiromesifen	In		
Penconazole	In	Spirotetramat	In		

* EU Pesticide Database, retrieved 08/01/2021 from <https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=search.as>

Agricultural status: *In*: Approved by the EU for agricultural applications.

Out: Not approved by the EU for agricultural applications

Table S-2. Description of the sampling sites

Sampling site	Latitude	Longitude	Description
Alzira	39°09'00"	0°27'28"	Rural and agricultural area surrounded by citrus groves (orange trees). Samples collected about 60 m above sea level.
Burriana	39°53'52"	0°03'54"	Rural and agricultural area surrounded by citrus groves (orange trees). Samples collected about 20 m above sea level.
Villar del Arzobispo	39°44'01"	0°49'38"	Rural and agricultural area surrounded by vineyards, cereals and olive trees. Samples collected about 520 m above sea level.
Caudete de las Fuentes	39°33'36"	1°16'58"	Rural and agricultural area surrounded by vineyards, cereals and olive trees. Samples collected about 770 m above sea level.
Sollana	39°16'27"	0°22'43"	Agricultural area surrounded by rice fields. Samples collected about 5 m above sea level.
Silla	39°22'01"	0°24'21"	Agricultural area surrounded by rice fields and persimmon. Samples collected about 10 m above sea level.
Callosa d'en Sarria	38°39'12"	0°07'28"	Agricultural area surrounded by loquat trees. Samples collected about 250 m above sea level.
L'Alcúdia	39°11'21"	0°33'57"	Agricultural area surrounded by persimmon and stone fruits orchards. Samples collected about 250 m above sea level.
Sant Jordi	40°30'34"	0°19'55"	Next to a golf course (Panorámica Golf), which occupies 80 ha. Samples collected at 181 m above sea level.
Viveros-Valencia city	39°28'46"	0°22'10"	Commercial and residential area and inside a park (Viveros) with gardens. Samples collected at 11 m above sea level.

Table S-3. Spatial distribution of the detected pesticides in the evaluated stations

Station	Alzira (N=6)			Burriana (N=6)			Viveros-Valencia (N=6)		
Pesticide	Frequency of detection (%) > LD	Range (pg m ⁻³)	Average (pg m ⁻³)*	Frequency of detection (%) > LD	Range (pg m ⁻³)	Average (pg m ⁻³)*	Frequency of detection (%) > LD	Range (pg m ⁻³)	Average (pg m ⁻³)*
Acetamiprid	100	<LOQ-18.52	18.52	100	<LOQ	-	50	<LOQ	-
Alpha-endosulfan	33	61.98-86.72	74.35	-	-	-	-	-	-
Azoxystrobin	100	<LOQ-31.15	31.15	100	<LOQ	-	100	<LOQ	-
Beta-endosulfan	-	-	-	-	-	-	17	91.33	91.33
Boscalid	83	<LOQ-14.35	14.35	-	-	-	83	<LOQ	-
Carbendazim	100	<LOQ	-	100	<LOQ	-	-	-	-
Chlorpropham	-	-	-	-	-	-	17	<LOQ	-
Chlorpyrifos-e	50	<LOQ-1553.84	1008.41	67	309.90-829.60	585.67	-	-	-
Chlorpyrifos-m	100	676.90-3484.52	2032.93	100	582.63-2061.15	1375.63	100	115.15-4372.96	1941.44
Cyproconazole	100	<LOQ-13.20	13.20	100	<LOQ-32.20	22.41	-	-	-
Dimethoate	83	<LOQ	-	83	<LOQ	-	100	<LOQ	-
Diuron	50	<LOQ	-	50	<LOQ	-	-	-	-
Endosulfan-sulfate	-	-	-	-	-	-	17	326.30	326.30
Imidacloprid	100	<LOQ	-	100	<LOQ	-	83	<LOQ	-
Iprovalicarb	67	<LOQ	-	67	<LOQ	-	50	<LOQ	-
Kresoxim-m	-	-	-	17	127.39	127.39	-	-	-
Lambda-cyhalothrin	17	492.26	492.26	-	-	-	50	80.60-92.28	84.48
Metalaxyl-M	100	<LOQ	-	100	<LOQ	-	100	<LOQ-44.16	27.48
Myclobutanil	67	<LOQ	-	-	-	-	-	-	-
Omethoate	83	<LOQ-37.37	34.04	100	<LOQ-21.62	18.25	100	<LOQ-31.85	31.85
Permethrin	-	-	-	50	52.75-324.00	177.47	33	96.56-106.58	101.57
Prochloraz	17	<LOQ	-	-	-	-	-	-	-
Pyrimethanil	100	<LOQ	-	100	<LOQ-106.47	106.47	17	<LOQ	-
Pyriproxyfen	83	<LOQ	-	100	<LOQ	-	-	-	-
Spirotetramat	100	13.86-232.36	66.90	67	<LOQ	-	33	<LOQ	-
Tebuconazole	100	<LOQ	-	100	<LOQ	-	-	-	-
Terbutylazine-2-OH	-	-	-	17	19.52	19.52	17	20.06	20.06
Thiabendazole	17	<LOQ	-	67	<LOQ	-	-	-	-
Trifluralin	100	131.41-444.32	273.82	33	154.87-381.52	268.19	50	63.60-72.87	67.75
Vinclozolin	17	34.19	34.19	-	-	-	17	33.18	33.18

N= Total samples

* The average was calculated from the arithmetic mean of samples with concentration above LOQ.

Table S-4. Obtained Hazard Quotient using average concentrations and maximum concentrations for adults (> 12 years)

Pesticide	Station					
	Alzira		Burriana		Valencia-Viveros	
	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)
Acetamiprid	7.53E-08	7.53E-08	-	-	-	-
Alpha-endosulfan	5.04E-06	5.88E-06	-	-	-	-
Azoxystrobin	4.43E-08	4.43E-08	-	-	-	-
Beta-endosulfan	-	-	-	-	6.19E-06	6.19E-06
Boscalid	4.08E-08	4.08E-08	-	-	-	-
Carbendazim	-	-	-	-	-	-
Chlorpropham	-	-	-	-	-	-
Chlorpyrifos-e	2.87E-04	4.42E-04	1.67E-04	2.36E-04	-	-
Chlorpyrifos-m	5.79E-05	9.92E-05	3.91E-05	5.98E-05	5.52E-05	1.24E-04
Cyproconazole	1.88E-07	1.88E-07	3.19E-07	4.58E-07	-	-
Dimethoate	-	-	-	-	-	-
Diuron	-	-	-	-	-	-
Endosulfan-sulfate	-	-	-	-	2.21E-05	2.21E-05
Imidacloprid	-	-	-	-	-	-
Iprovalicarb	-	-	-	-	-	-
Kresoxim-m	-	-	4.03E-08	4.03E-08	-	-
Lambda-cyhalothrin	2.22E-04	2.22E-04	-	-	3.82E-05	4.08E-05
Metalaxyl-M	-	-	-	-	9.77E-08	1.57E-07
Myclobutanil	-	-	-	-	-	-
Omethoate	3.23E-05	3.54E-05	1.73E-05	2.05E-05	3.02E-05	3.02E-05
Permethrin	-	-	2.02E-07	3.69E-07	1.16E-07	1.21E-07
Prochloraz	-	-	-	-	-	-
Pyrimethanil	-	-	2.52E-07	2.52E-07	-	-
Pyriproxyfen	-	-	-	-	-	-
Spirotetramat	3.81E-07	1.32E-06	-	-	-	-
Tebuconazole	-	-	-	-	-	-
Terbutylazine-2-OH	-	-	1.74E-06	1.74E-06	1.78E-06	1.78E-06
Thiabendazole	-	-	-	-	-	-
Trifluralin	3.00E-06	4.86E-06	2.94E-06	4.18E-06	7.41E-07	7.98E-07
Vinclozolin	4.86E-07	4.86E-07	-	-	4.72E-07	4.72E-07

Table S-5. Obtained Hazard Quotient using average concentrations and maximum concentrations for children (1-6 years)

Pesticide	Station					
	Alzira		Burriana		Valencia-Viveros	
	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)
Acetamiprid	1.78E-07	1.78E-07	-	-	-	-
Alpha-endosulfan	1.19E-05	1.39E-05	-	-	-	-
Azoxystrobin	1.05E-07	1.05E-07	-	-	-	-
Beta-endosulfan	-	-	-	-	1.46E-05	1.46E-05
Boscalid	9.65E-08	9.65E-08	-	-	-	-
Carbendazim	-	-	-	-	-	-
Chlorpropham	-	-	-	-	-	-
Chlorpyrifos-e	6.78E-04	1.04E-03	3.94E-04	5.57E-04	-	-
Chlorpyrifos-m	1.37E-04	2.34E-04	9.24E-05	1.41E-04	1.30E-04	2.94E-04
Cyproconazole	4.44E-07	4.44E-07	7.53E-07	1.08E-06	-	-
Dimethoate	-	-	-	-	-	-
Diuron	-	-	-	-	-	-
Endosulfan-sulfate	-	-	-	-	5.22E-05	5.22E-05
Imidacloprid	-	-	-	-	-	-
Iprovalicarb	-	-	-	-	-	-
Kresoxim-m	-	-	9.51E-08	9.51E-08	-	-
Lambda-cyhalothrin	5.25E-04	5.25E-04	-	-	9.01E-05	9.63E-05
Metalaxyl-M	-	-	-	-	2.31E-07	3.71E-07
Myclobutanil	-	-	-	-	-	-
Omethoate	7.63E-05	8.37E-05	4.09E-05	4.84E-05	7.14E-05	7.14E-05
Permethrin	-	-	4.77E-07	8.71E-07	2.73E-07	2.86E-07
Prochloraz	-	-	-	-	-	-
Pyrimethanil	-	-	5.96E-07	5.96E-07	-	-
Pyriproxyfen	-	-	-	-	-	-
Spirotetramat	8.99E-07	3.12E-06	-	-	-	-
Tebuconazole	-	-	-	-	-	-
Terbutylazine-2-OH	-	-	4.10E-06	4.10E-06	4.21E-06	4.21E-06
Thiabendazole	-	-	-	-	-	-
Trifluralin	7.08E-06	1.15E-05	6.93E-06	9.86E-06	1.75E-06	1.88E-06
Vinclozolin	1.15E-06	1.15E-06	-	-	1.11E-06	1.11E-06

Table S-6. Obtained Hazard Quotient using average concentrations and maximum concentrations for infants (6 months-1.5 years)

Pesticide	Station					
	Alzira		Burriana		Valencia-Viveros	
	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)	HQ (using average concentration)	HQ (using maximum concentration)
Acetamiprid	2.10E-07	2.10E-07	-	-	-	-
Alpha-endosulfan	1.40E-05	1.64E-05	-	-	-	-
Azoxystrobin	1.23E-07	1.23E-07	-	-	-	-
Beta-endosulfan	-	-	-	-	1.72E-05	1.72E-05
Boscalid			-	-	-	-
Carbendazim	-	-	-	-	-	-
Chlorpropham	-	-	-	-	-	-
Chlorpyrifos-e	7.99E-04	1.23E-03	4.64E-04	6.57E-04	-	-
Chlorpyrifos-m	1.61E-04	2.76E-04	1.09E-04	1.66E-04	1.54E-04	3.46E-04
Cyproconazole	5.23E-07	5.23E-07	8.87E-07	1.28E-06	-	-
Dimethoate	-	-	-	-	-	-
Diuron	-	-	-	-	-	-
Endosulfan-sulfate	-	-	-	-	6.15E-05	6.15E-05
Imidacloprid	-	-	-	-	-	-
Iprovalicarb	-	-	-	-	-	-
Kresoxim-m	-	-	1.12E-07	1.12E-07	-	-
Lambda-cyhalothrin	6.19E-04	6.19E-04	-	-	1.06E-04	1.13E-04
Metalaxyl-M	-	-	-	-	2.72E-07	4.37E-07
Myclobutanil	-	-	-	-	-	-
Omethoate	8.99E-05	9.87E-05	4.82E-05	5.71E-05	8.41E-05	8.41E-05
Permethrin	-	-	5.62E-07	1.03E-06	3.22E-07	3.38E-07
Prochloraz	-	-	-	-	-	-
Pyrimethanil	-	-	7.03E-07	7.03E-07	-	-
Pyriproxyfen	-	-	-	-	-	-
Spirotetramat	1.06E-06	3.68E-06	-	-	-	-
Tebuconazole	-	-	-	-	-	-
Terbutylazine-2-OH	-	-	4.83E-06	4.83E-06	4.97E-06	4.97E-06
Thiabendazole	-	-	-	-	-	-
Trifluralin	8.34E-06	1.35E-05	8.17E-06	1.16E-05	2.06E-06	2.22E-06
Vinclozolin	1.35E-06	1.35E-06	-	-	1.31E-06	1.31E-06

Table S-7. Cumulative exposure (using maximum concentrations)

Pesticide group	Alzira			Burriana			Valencia-Viveros		
	Adults	Children	Infants	Adults	Children	Infants	Adults	Children	Infants
Organophosphate	5.77E-04	1.36E-03	1.61E-03	3.16E-04	7.47E-04	8.80E-04	1.55E-04	3.65E-04	4.30E-04
Pyrethroids	-	-	-	-	-	-	4.09E-05	9.66E-05	1.14E-04

Table S-8. Cancer risk of potential carcinogenic pesticides (using maximum concentrations)

Alzira			
Pesticide	Adults	Children	Infants
Alpha-endosulfan	2.47E-09	5.83E-09	6.87E-09
Chlorpyrifos-e	4.42E-08	1.04E-07	1.23E-07
Cyproconazole	3.76E-10	8.87E-10	1.05E-09
Lambda-cyhalothrin	1.40E-08	3.31E-08	3.89E-08
Burriana			
Pesticide	Adults	Children	Infants
Chlorpyrifos-e	2.36E-08	5.57E-08	6.57E-08
Cyproconazole	9.16E-10	2.16E-09	2.55E-09
Kresoxim-m	3.63E-09	8.56E-09	1.01E-08
Permethrin	9.22E-09	2.17E-08	2.56E-08
Pyrimethanil	3.03E-09	7.15E-09	8.43E-09
Valencia-Viveros			
Pesticide	Adults	Children	Infants
Beta-endosulfan	2.59E-09	6.13E-09	7.23E-09
Endosulfan-sulfate	9.29E-09	2.19E-08	2.58E-08
Lambda-cyhalothrin	2.63E-09	6.20E-09	7.31E-09
Metalaxyl-M	1.26E-09	2.97E-09	3.50E-09
Permethrin	3.03E-09	7.16E-09	8.44E-09