SUPLEMENTARY DATA

Pesticide Inhalation Exposure of Applicators and Bystanders Using Conventional and Innovative Cropping Systems in the Valencian Region, Spain

Esther Fuentes [1], Antonio López [1], María Ibáñez [2], Vicent Yusà [1,3,4], Amalia Muñoz [5], Teresa Vera [5], Esther Borrás [5], Héctor Calvete-Sogo [5] and 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; fuentes_estfer@gva.es (E.F.); lopez_anttob@gva.es (A.L.); yusa_vic@gva.es (V.Y.)
[2] Environmental and Public Health Analytical Chemistry, Research Institute for Pesticides and Water, University Jaume I, S/N, Avda Sos Baynat, Castelló de la Plana, 12071 Castelló, Spain; ibanezm@uji.es
[3] Public Health Laboratory of Valencia, 21, Avenida Catalunya, 46020 Valencia, Spain
[4] Analytical Chemistry Department, University of Valencia, Edifici Jeroni Muñoz, Carrer del Dr. Moliner 50, 46100 Burjassot, Spain
[5] Insitituto Universitario UMH-CEAM, C/Charles Darwin, 14, Parque Tecnológico, Paterna, 46980 Valencia, Spain; amalia@ceam.es (A.M.); teresa@ceam.es (T.V.); esther@ceam.es (E.B.); hectorcalvete@ceam.es (H.C.)
* Correspondence: coscolla_cla@gva.es; Tel.: +34-96192-6333

Table S1. Pesticides vapour pressures

Compound	Vapour pressure at 20 °C (mPa)
Imidacloprid	4.0×10^{-7}
Oxamyl	0.018
Difenoconazole	3.33×10^{-5}
Acetamiprid	1.73×10^{-4}
Azoxistrobin	1.1×10^{-7}
Bupirimate	0.057
Fosetyl-Al	1.00×10^{-4}
Oxyfluorfen	0.026
Methyl-Chlorpyrifos	3.0
Azadirachtin	2.0×10^{-4}
Lambda- Cyhalotrin	3.6×10^{-10}

Table S2. Conventional Treatments, 2017 season

CONVENTIONAL TREATMENT 2017									
Location	**Area**	**Plot**	**Crop**	**Type**	**Surface (m^2)**	**Date**	**Mode**	**Pesticide**	**Vol (L/ha)**
Alcudia	29	36	Citrus	Satsuma	3200	03/07/2018	Turbo	Imidacloprid	1400
Alcudia	29	36	Citrus	Satsuma	3200	23/08/2018	Turbo	Imidacloprid	1400
Alcudia	26	443	Stone Fruit	Nectarine	2090	12/07/2017	Turbo	Ethyl-Chlorpyrifos	1400
Alcudia	25	37	Caqui	Red Brilliant	8100	01/08/2017	Turbo	Azadirachtin	1400
Alcudia	26	203	Citrus	Satsuma	4700	02/08/2017	Turbo	Azadirachtin	1400
Alcudia	26	203	Citrus	Satsuma	4700	01/09/2017	Turbo	Azadirachtin	1400
Alcudia	26	203	Citrus	Satsuma	4700	25/09/2017	Turbo	Azadirachtin	1400
Alcudia	29	98a	Citrus	Satsuma	2500	04/09/2017	Turbo	Metalaxyl	1400

Table S3. Conventional Treatments, 2018 season

CONVENTIONAL TREATMENT 2018										
Location	**Area**	**Plot**	**Crop**	**Type**	**Surface(m²)**	**Date**	**Mode**	**Pesticide**	**vol. (L/ha)**	**Dose (mL/hL)**
Alcudia	27	99	Watermelon	-	-	17/04/2018		Imidacloprid	-	-
Alcudia	26	203	Citrus	Satsuma	4500	06/07/2018	Turbo	Imidacloprid	2400	50
Alcudia	26	203	Citrus	Satsuma	4500	18/07/2018	Turbo	Imidacloprid	2400	50
Alcudia	26	203	Citrus	Satsuma	4500	08/08/2018	Turbo	Imidacloprid	1400	50
Alcudia	27	99	WaterMelon	-	-	30/04/2018		Oxamyl	-	-
Alcudia	26	443	Stone Fruit	Nectarine	2090	15/05/2018	Turbo	Difenoconazole	1400	30
Alcudia	25	37	Persimmon	Red Brilliant	8100	11/06/2018	Turbo	Difenoconazole	2400	25
Alcudia	26	443	Stone Fruit	Nectarine	2090	18/05/2018	Turbo	Acetamiprid	1400	400*
Alcudia	26	203	Citrus	Satsuma	4500	21/06/2018	Turbo	Acetamiprid	2400	25*
Alcudia	26	203	Persimmon	Satsuma	4500	25/05/2018	Turbo	Azoxistrobin	2400	100
Alcudia	27	99	WaterMelon	-	-	31/05/2018		Bupirimate	-	-
Alcudia	27	99	WaterMelon	-	-	22/06/2018		Bupirimate	-	-
Alcudia	29	98a	Citrus	Satsuma	2500	12/06/2018	Turbo	Fosetyl	2400	250*
Alcudia	29	98a	Citrus	Satsuma	2500	13/09/2018	Turbo	Fosetyl	1400	250*
Alcudia	29	98a	Citrus	Satsuma	2500	09/07/2018		Oxyfluorfen	-	-
Alcudia	24	4	Stone Fruit	117	5906	27/06/2018	Turbo	Methyl-Chlorpyrifos	1400	300
Alcudia	24	4	Stone Fruit	117	5906	16/07/2018	Turbo	Methyl-Chlorpyrifos	1400	300
Alcudia	24	4	Stone Fruit	117	5906	30/07/2018	Turbo	Methyl-Chlorpyrifos	1400	300
Alcudia	25	37	Persimmon	RedBrilliant	8100	04/07/2018	Turbo	Azadirachtin	2400	100
Alcudia	25	37	Persimmon	Red Brilliant	8100	01/08/2018	Turbo	Azadirachtin	1400	100
Alcudia	25	37	Persimmon	Red Brilliant	8100	20/08/2018	Turbo	Azadirachtin	1400	100
Alcudia	29	98a	Citrus	Satsuma	2500	21/08/2018	Turbo	Azadirachtin	1400	10
Alcudia	26	203	Citrus	Satsuma	4500	03/08/2018		Azadirachtin	-	-
Alcudia	29	98b	Persimmon	Red Brilliant	5400	12/09/2018	Turbo	Azadirachtin	1400	100
Alcudia	25	37	Persimmon	Red Brilliant	8100	18/09/2018	Turbo	Azadirachtin	1400	100

Alcudia	25	37	Persimmon	Red Brilliant	8100	01/10/2018	Turbo	Azadirachtin	800	100
Alcudia	29	98b	Persimmon	Red Brilliant	5400	11/10/2018	Turbo	Azadirachtin	800	100
Alcudia	29	36	Citrus	Satsuma	3200	19/09/2018	Turbo	Lambda-Cyhalotrin	1400	10
Alcudia	29	36	Citrus	Satsuma	3200	02/10/2018	Turbo	Lambda-Cyhalotrin	1400	10
Alcudia	29	36	Citrus	Satsuma	3200	15/10/2018	Turbo	Lambda-Cyhalotrin	1400	10

*Solid commercial product, dose units: g/hL

Table S4. Alternative Treatments, 2017 season

ALTERNATIVE TREATMENT 2017

Location	Area	Plot	Crop	Type	Surface(m²)	Date	Mode	Pesticide	Vol(L/ha)	Dose (mL/hL)
Alcudia	26	140	StoneFruit	Nectarine	7690	03/07/2017	Irrigation	Imidacloprid	-	-
Alcudia	4	121a	Persimmon	RedBrillant	13,047	09/08/2017	Irrigation	Azadirachtin	1.3	-
Alcudia	26	140	Citrus	Satsuma	7690	25/09/2017	Irrigation	Azadirachtin	-	50

Table S5. Alternative Treatments, 2018 season

ALTERNATIVE TREATMENT 2018

Location	Area	Plot	Crop	Type	Surface(m²)	Date	Mode	Pesticide	Dose (mL/hL)
Alcudia	25	20	WaterMelon	-	-	18/04/2018	Irrigation	Imidacloprid	-
Alcudia	26	140	Citrus	Satsuma	7690	10/07/2018	Irrigation	Imidacloprid	50
Alcudia	25	107	Citrus	Satsuma	6618	17/07/2018	Irrigation	Imidacloprid	50
Alcudia	26	140	Citrus	Satsuma	7690	02/08/2018	Irrigation	Imidacloprid	50
Alcudia	25	20	Melon	-	-	22/05/2018	Irrigation	Oxamyl	-
Alcudia	4	121a	Persimmon	RedBrilliant	13,407	20/06/2018	Irrigation	Difenoconazole	25
Alcudia	4	121b	Citrus	Satsuma	2000	20/06/2018	Irrigation	Acetamiprid	25*
Alcudia	25	20	Watermelon	-	-	21/06/2018	Irrigation	Bupirimate	-
Alcudia	4	121a	Persimmon	RedBrilliant	13,407	08/06/2018	Irrigation	Azoxystrobin	100
Alcudia	4	121b	Citrus	Satsuma	2000	08/06/2018	Irrigation	Fosetyl-Al	600*
Alcudia	25	107	Citrus	Satsuma	6618	20/09/2018	Irrigation	Fosetyl-Al	600*
Alcudia	4	121b	Citrus	Satsuma	2000	13/07/2018	Irrigation	Oxyfluorfen	30

Alcudia	26	143	Persimon	RedBrilliant	6525	29/06/2018	Irrigation	Azadirachtin	100
Alcudia	4	121b	Citrus	Satsuma	2000	22/08/2018	Irrigation	Azadirachtin	10
Alcudia	26	306	Stone Fruit	UFO-4	5612	25/06/2018	Irrigation	Biorend	50
Alcudia	26	306	Stone Fruit	UFO-4	5612	31/07/2018	Irrigation	Biorend	50
Alcudia	26	140	Citrus	Satsuma	7690	02/08/2018	Irrigation	Biorend	50
Alcudia	26	306	Stone Fruit	UFO-4	5612	03/08/2018	Irrigation	Biorend	50
Alcudia	4	121a	Persimmon	RedBrilliant	13,407	22/08/2018	Irrigation	Biorend	50
Alcudia	26	140	Citrus	Satsuma	7690	14/09/2018	Irrigation	Biorend	50
Alcudia	26	143	Persimmon	RedBrilliant	6525	14/09/2018	Irrigation	Biorend	50
Alcudia	26	308	Persimmon	RedBrilliant	4779	24/09/2018	Irrigation	Biorend	50
Alcudia	25	107	Citrus	Satsuma	6618	24/09/2018	Irrigation	Biorend	50
Alcudia	26	143	Persimmon	RedBrilliant	6525	05/10/2018	Irrigation	Biorend	50
Alcudia	26	140	Citrus	Satsuma	7690	05/10/2018	Irrigation	Biorend	50
Alcudia	4	121a	Persimmon	RedBrilliant	13407	16/10/2018	Irrigation	Biorend	50
Alcudia	4	121b	Citrus	Satsuma	2000	16/10/2018	Irrigation	Biorend	50
Alcudia	26	306	Stone Fruit	UFO-4	5612	29/06/2018	Irrigation	Tebuconazole	60
Alcudia	25	115	Stone Fruit	UFO-5	7098	17/07/2018	Irrigation	Pendimethalin	300

*Solid commercial product, dose units: g/hL

Table S6. Relationship between atmospheric parameters and drift effect. Conventional treatment, 2017 season.

Pesticide	Day	Temp.Min (ºC)	Temp.Max (ºC)	Hum.Min (%)	Hum.Max (%)	WS.Min (Km/h)	WS.Max (Km/h)	Conc. Crop Sampler (pg/m³)	Conc. Drift Sampler (pg/m³)	% Drift Effect
Imidacloprid	03/07/2018	18.1	27.5	50	77	2	10	262250.91	123511.23	47
Imidacloprid	23/08/2018	20.5	29.1	53	86	2	7	482617.67	41739.24	9
Ethyl-Chlorpyrifos	12/07/2017	22.3	30.7	53	86	2	7	116716.84	91244.56	78
Azadirachtin	01/08/2017	19.2	21.1	64	70	2	6	219543.32	27442.93	13
Azadirachtin	02/08/2017	25.8	27.3	78.5	82	6	20	185321.3	30886.88	17
Azadirachtin	01/09/2017	21.7	24.3	69.7	85	5	15	122456.41	30614.25	25
Azadirachtin	25/09/2017	18.8	31.5	23.8	71.5	4	25	98143.78	40893.24	42
Metalaxyl	04/09/2017	19.6	28.3	59.7	82.7	2	15	7311.19	ND*	

* Upwind sampler

Table S7. Relationship between atmospheric parameters and drift effect. Conventional treatment, 2018 season.

Pesticide	Day	Temp.Min (ºC)	Temp.Max (ºC)	Hum.Min (%)	Hum.Max (%)	WS.Min (Km/h)	WS.Max (Km/h)	Conc. Crop. Sampler (pg/m³)	Conc. Drift Sampler (pg/m³)	% Drift Effect
Imidacloprid	17/04/2018	11.3	23.8	39	80	4	9.3	12432.21	103.22*	1
Imidacloprid	06/07/2018	25.2	29.2	55	70	10	20.4	221,350.91	98,765.23	45
Imidacloprid	18/07/2018	26	31.1	52	74	10	22.2	198,745.32	104,843.21	53
Imidacloprid	08/08/2018	27.3	34.8	30	54	5	14	471,342.25	29,839.41**	6
Oxamilo	30/04/2018	18.5	19.4	33	39	20	37	9643.22	98.71*	1
Difenoconazol	15/05/2018	20.6	23.8	41	48	10	26	77,432.25	987.42**	1
Difenoconazol	11/06/2018	19.6	25.5	45	64	15	27.8	103,567.22	12,432.21*	12
Acetamiprid	18/05/2018	15	23.7	46	79	10	18.5	11,032.22	208.21**	2
Acetamiprid	21/06/2018	22.7	31.3	37	66	10	18.5	77,435.03	6453.21	8
Azoxistrobin	25/05/2018	19.4	20.5	81	85	25	37	112,435.76	77,432.18	69
Bupirimato	31/05/2018	19.2	28.1	39	69	9	13	9341.32	83.12**	1
Bupirimato	22/06/2018	23.4	33.5	27	57	10	25	8765.32	187.21**	2
Fosetyl-Al	12/06/2018	21	27.5	38	57	10	25.9	187,431.22	79,987.63	43
Fosetyl-Al	13/09/2018	21.6	29.7	52	87	2	9.3	7311.18	825.42	11
Oxifluorofen	09/07/2018	25.9	32.2	43	63	2	20.1	10,022.12	216.15**	2

Methyl-Clorpirifos	27/06/2018	25.1	29.7	53	72	2	20.1	167,398.91	92,334.78	55
Methyl-Clorpirifos	16/07/2018	26.3	32.2	25	39	15	28.2	104,341.3	13,007.61	12
Methyl-Clorpirifos	30/07/2018	25.2	30.4	35	58	10	22.5	478,580.43	29,566.3*	6
Azadirachtin	04/07/2018	22.6	29.3	57	88	2	13	98,435.61	1022.47**	1
Azadirachtin	01/08/2018	26.6	34.1	33	66	5	14	47,231.98	522.23	1
Azadirachtin	20/08/2018	23.3	29.6	33	53	2	9.7	101,232.3	9655.43**	10
Azadirachtin	21/08/2018	24.2	30.4	33	53	0,5	8	76,976.22	732.08	1
Azadirachtin	03/08/2018	25.6	29.5	69	83	5	14.8	41,232.21	437.86*	1
Azadirachtin	12/09/2018	22.2	29.8	53	93	2	7.4	55,789.31	340.82	1
Azadirachtin	18/09/2018	22.1	27.9	64	87	5	7.4	27,632.11	9872.32	36
Azadirachtin	01/10/2018	17.9	26.1	52	88	5	16.5	28,901.32	6576.21	23
Azadirachtin	11/10/2018	17.4	25.4	61	87	5	9.3	131,567.22	8342.11	6
Lambda-Cyhalotrin	19/09/2018	21.7	27.7	63	90	2	11.1	122,723.91	7965.22	6
Lambda-Cyhalotrin	02/10/2018	16.5	24.5	38	74	4	13	95,813.04	10,570.65	11
Lambda-Cyhalotrin	15/10/2018	16.4	21.6	44	62	20	38.9	50,671.74	6506.52*	13

* Upwind sampler **Variable wind during the application

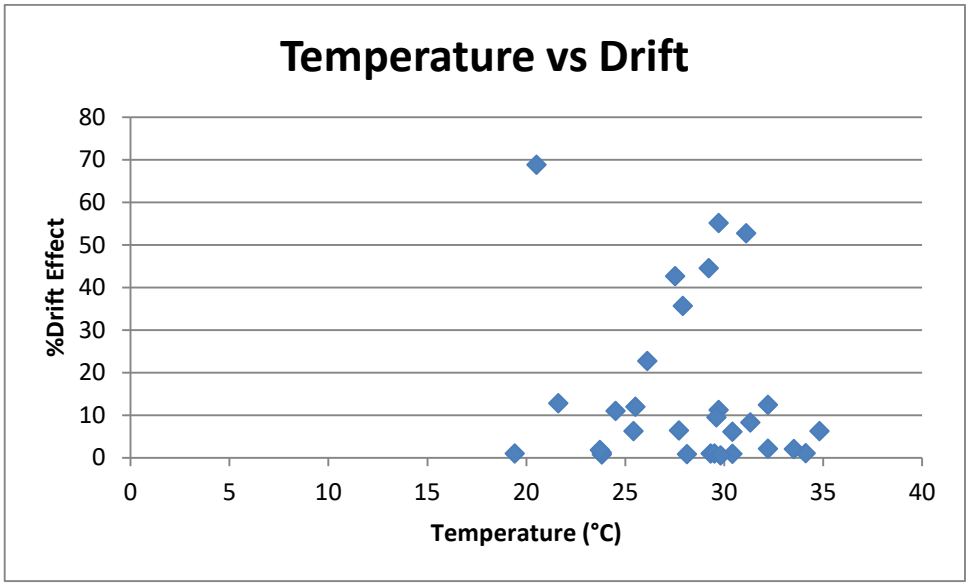

Figure S1. Temperature vs Drift effect

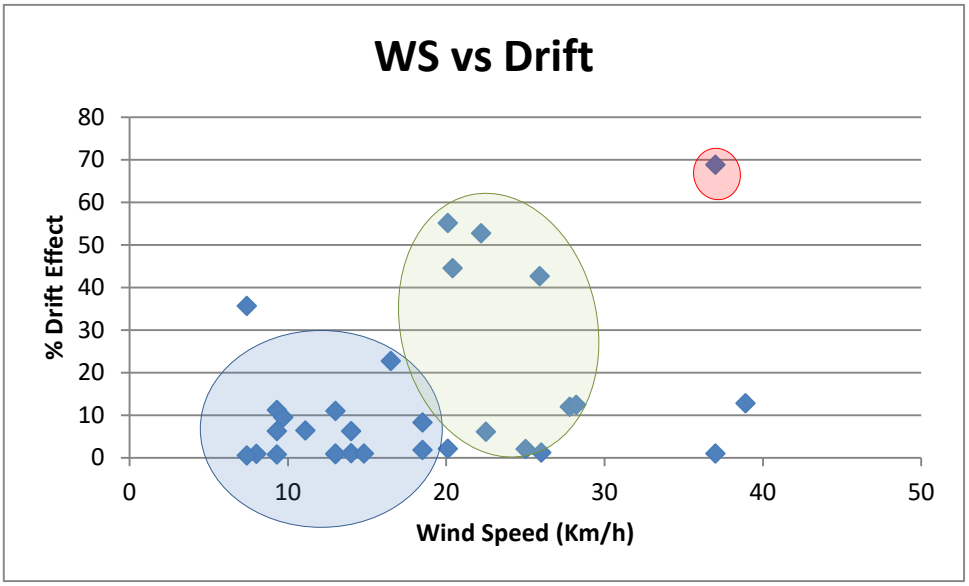

Figure S2. Wind speed vs Drift effect

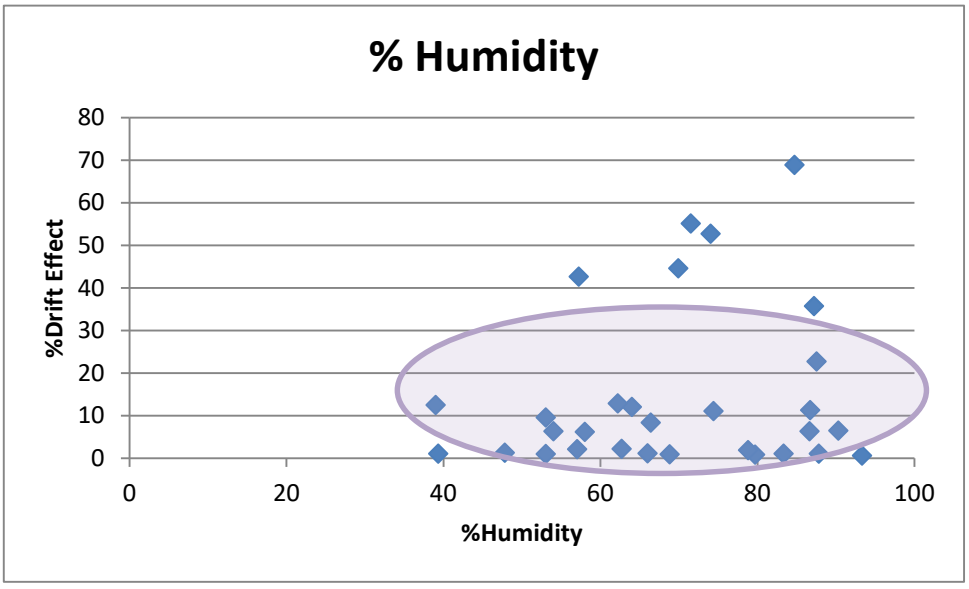

Figure S3. Humidity vs Drift effect