

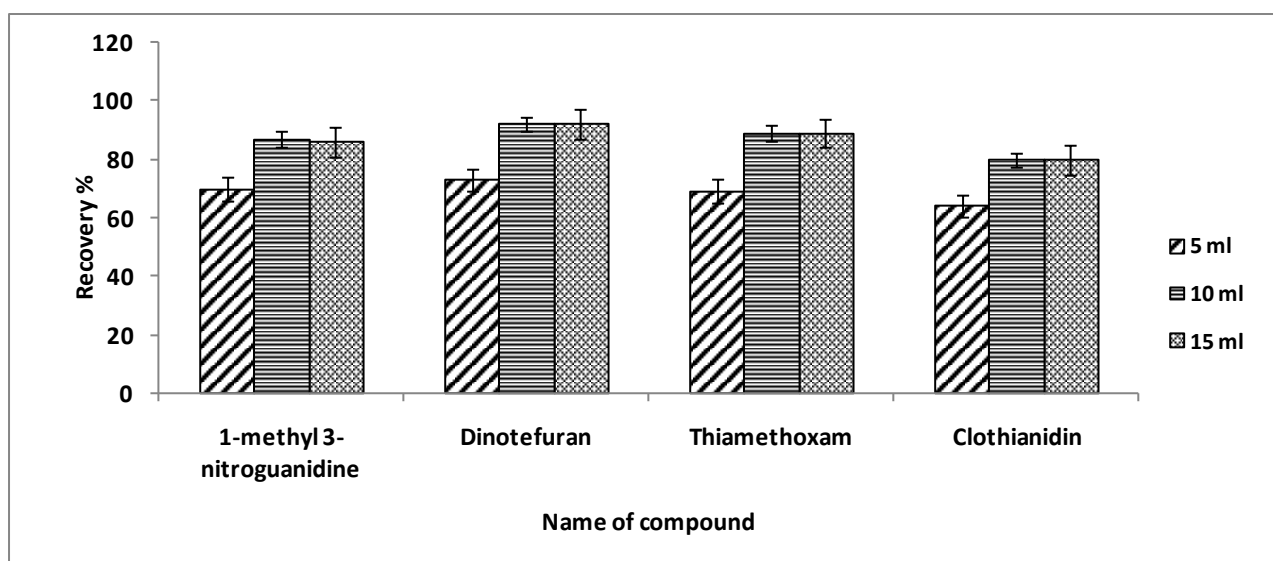


Figure S1: Effect of different volumes of acetonitrile used for extraction of cucumbers on the recovery of the four compounds by applying the proposed HPLC method.

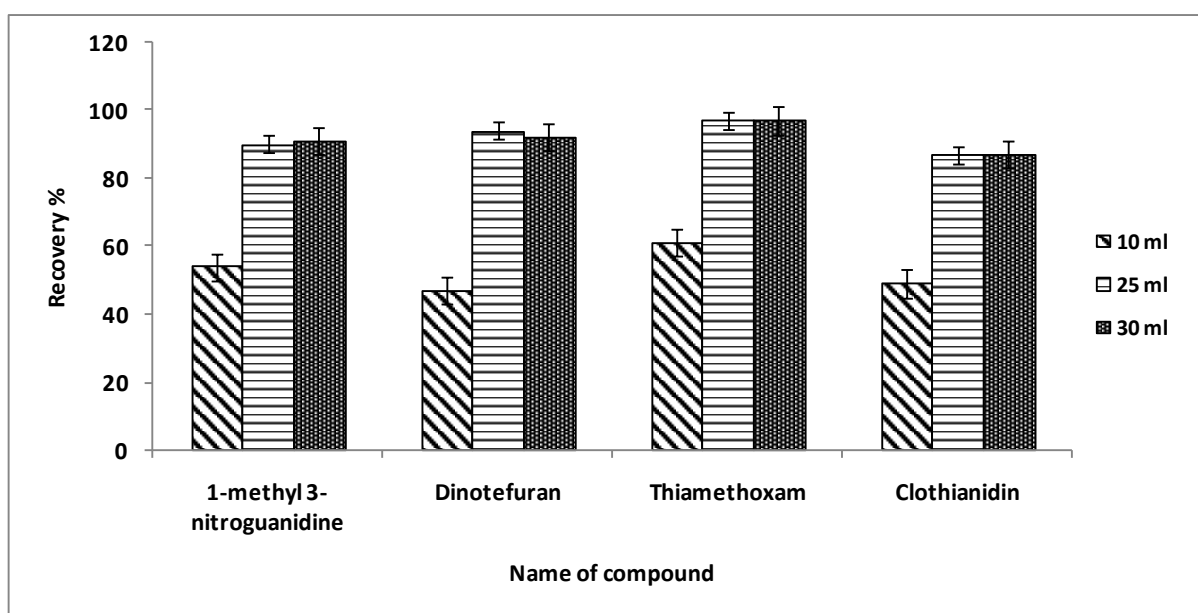
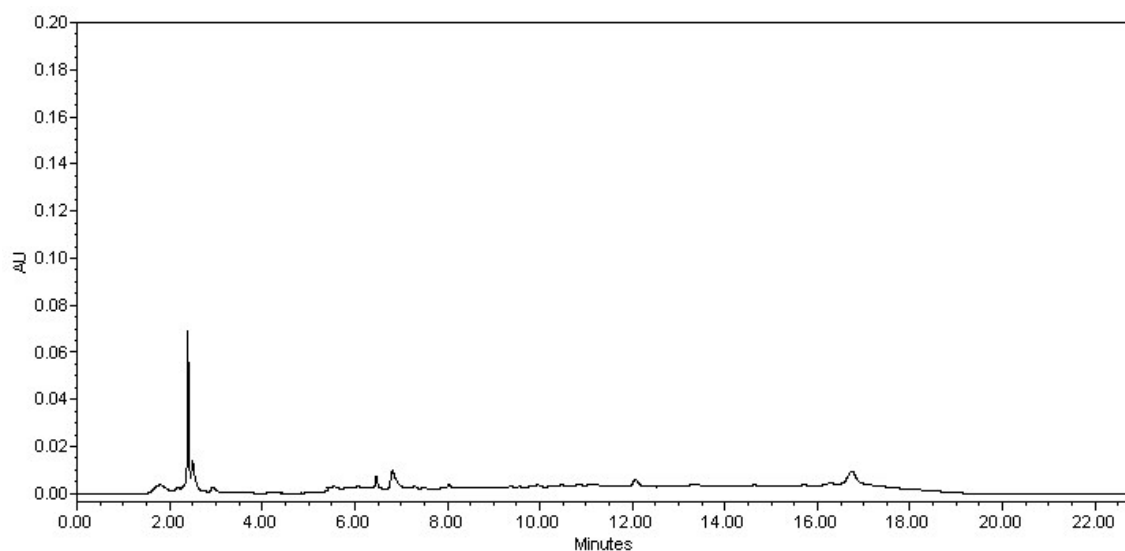


Figure S2: Effect of different volumes of acetonitrile: dichloromethane used for extraction of soil on the recovery of the four compounds by applying the proposed HPLC method.



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Figure S 3a: HPLC chromatogram of blank cucumber using the specified chromatographic conditions.

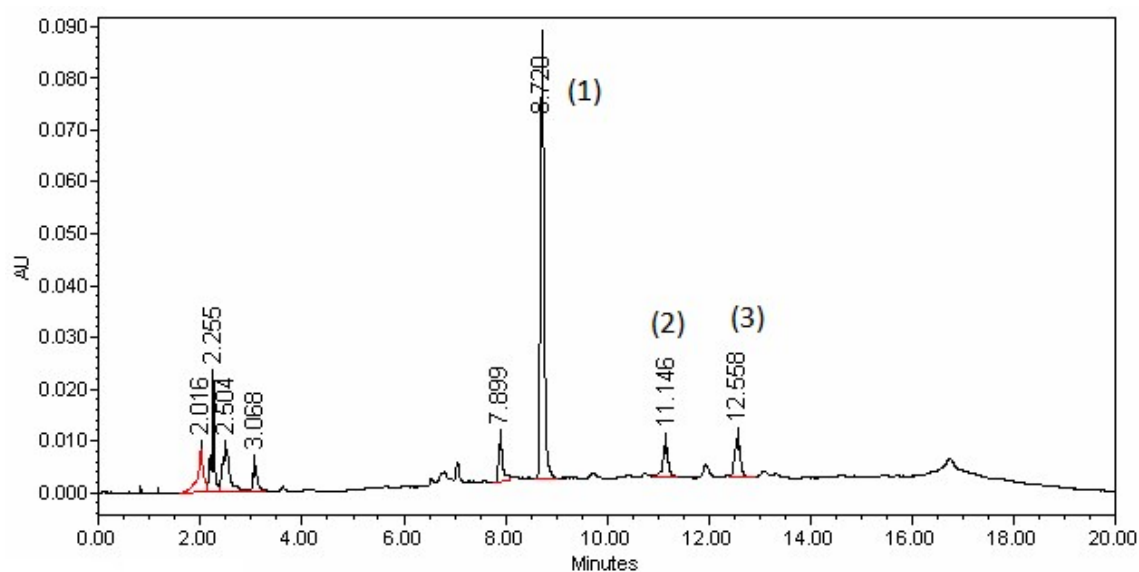


Figure S 3b: HPLC chromatogram of the compounds found in sprayed cucumber samples at day zero using the specified chromatographic conditions. (1). Dinotefuran,(2).Thiamethoxam,(3). Clothianidin

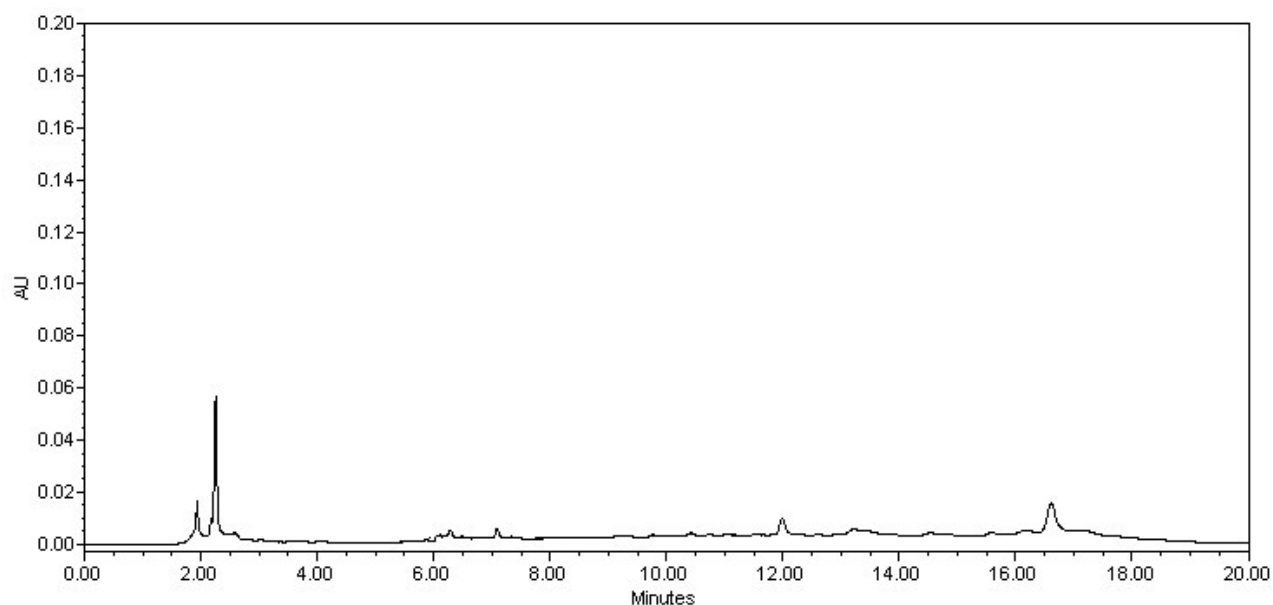


Figure S4a: HPLC chromatogram of blank soil using the specified chromatographic conditions.

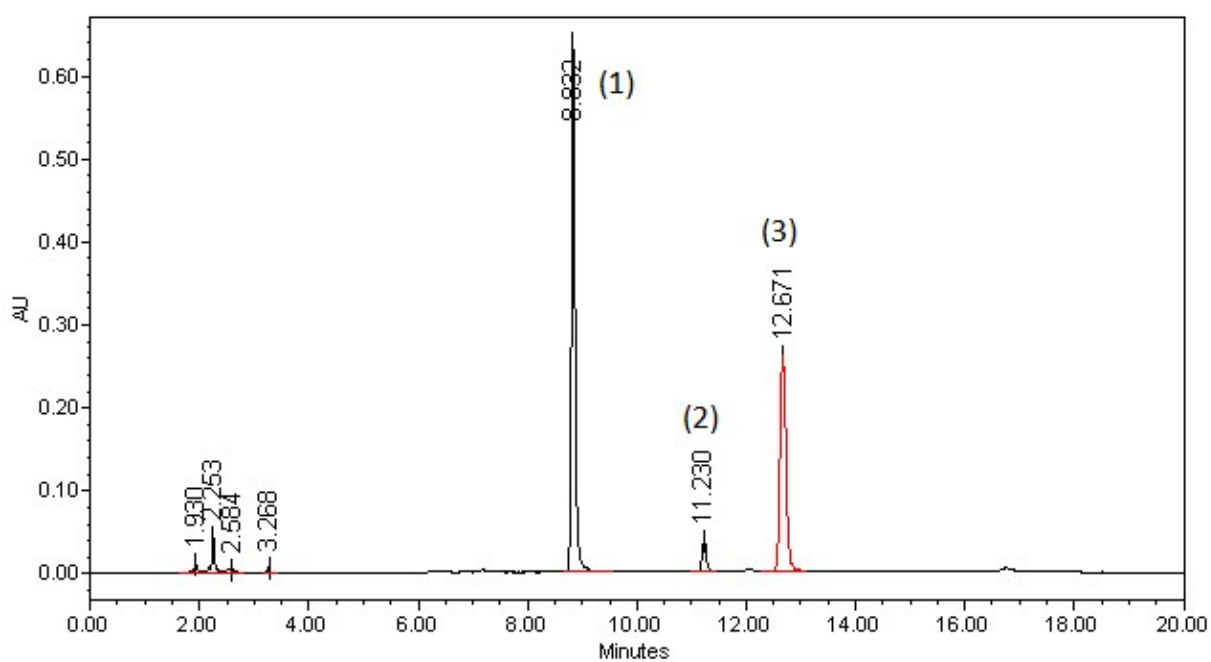


Figure S 4b: HPLC chromatogram of the compounds found in sprayed soil samples at day zero using the specified chromatographic conditions. (1). Dinotefuran,(2).Thiamethoxam,(3). Clothianidin

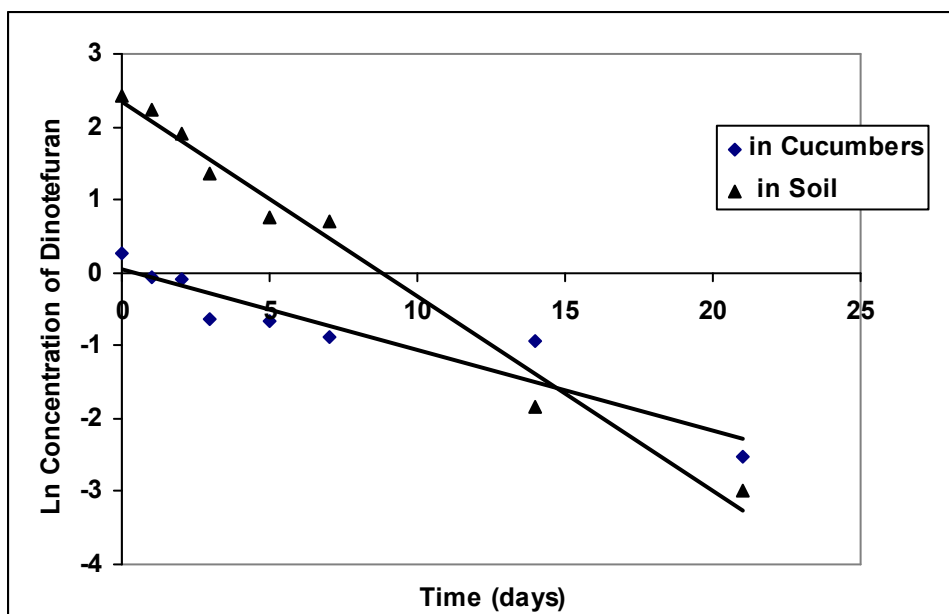


Figure S5: Decline of $\ln$ Dinotefuran residues concentration in cucumbers and soil with time using the proposed method.

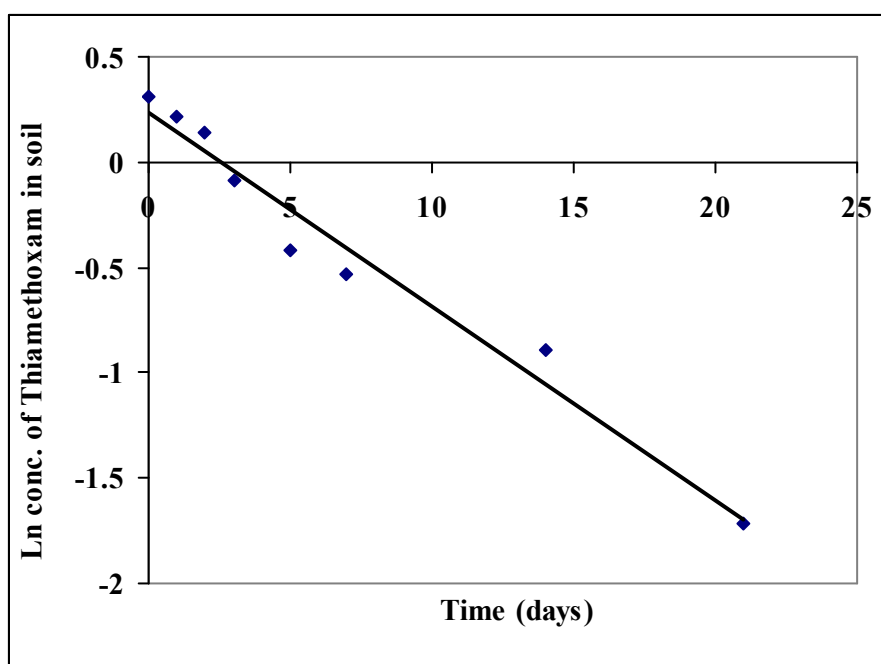


Figure S6: Decline of $\ln$ Thiamethoxam residues concentration in soil with time using the proposed method.

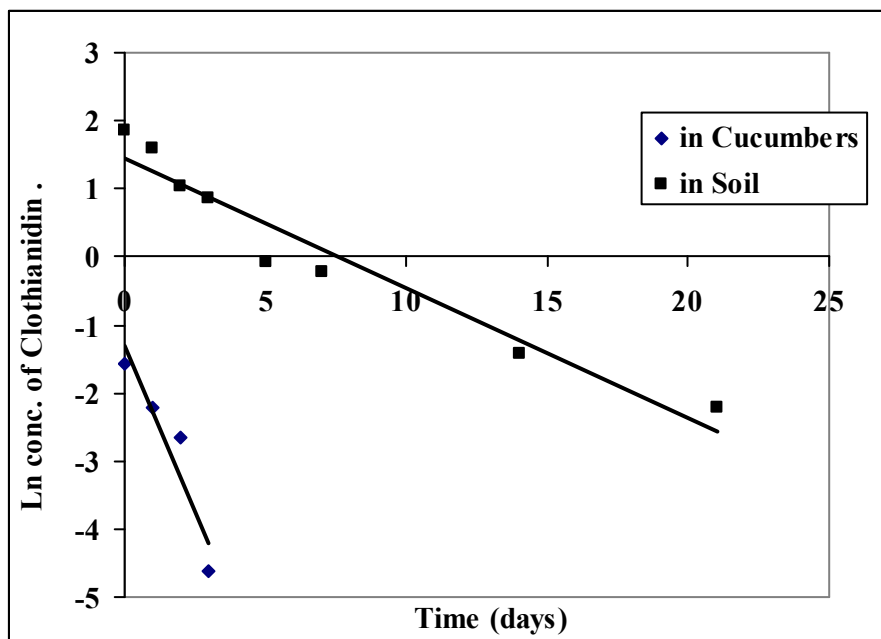


Figure S7: Decline of Ln Clothianidin residues concentration in cucumbers and soil with time using the proposed method.

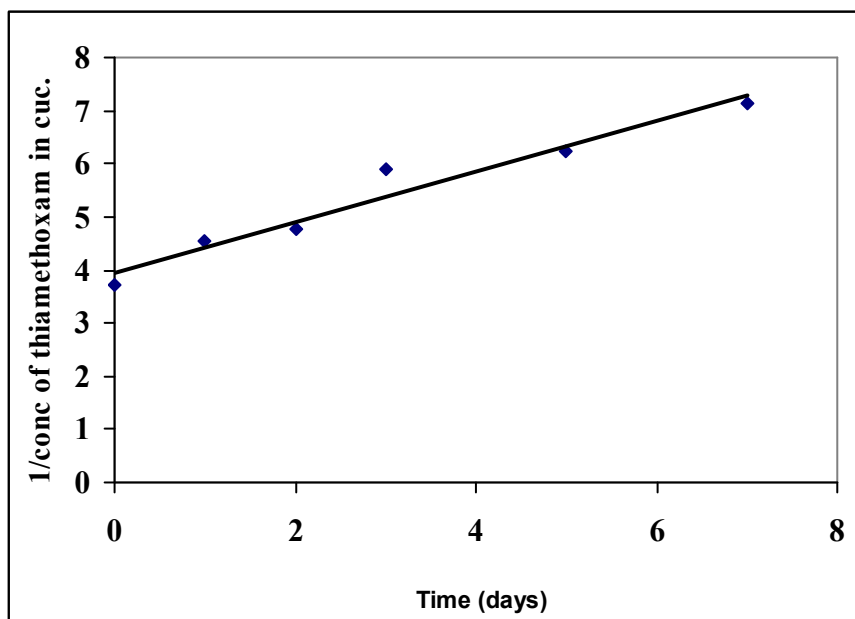


Figure S8: Plot of 1/ thiamethoxam residues concentration in cucumbers against time using the proposed method.

Table S1. Recovery results of the proposed method for the analysis of pure samples of four compounds

Name of Compound	Taken (µg/ml)	Found (µg/ml)	Recovery %	Name of Compound	Taken (µg/ml)	Found (µg/ml)	Recovery %
1-methyl 3-nitroguanidine	0.10	0.10	100.00	Thiamethoxam	0.30	0.30	100.00
	0.50	0.51	101.76		0.50	0.51	102.00
	1.00	0.98	98.00		1.00	1.02	102.00
	1.50	1.50	100.00		2.00	1.98	99.17
	2.00	1.99	99.53		3.00	2.99	99.54
	2.50	2.51	100.36		4.00	4.00	100.00
	3.00	3.03	101.10		5.00	4.99	99.69
	5.00	4.98	99.66		10.00	10.01	100.10
			99.87±1.31				100.30±1.44
Dinotefuran	0.10	0.10	100.00	Clothianidin	0.30	0.31	102.41
	0.30	0.29	98.30		0.50	0.51	102.41
	0.50	0.49	98.80		1.00	1.02	102.24
	1.00	0.99	99.00		2.00	2.01	102.24
	2.00	0.99	99.06		2.00	2.97	100.55
	2.00	1.98	99.06		3.00	2.97	100.55
	3.00	1.98	100.00		3.00	3.99	99.00
	3.00	3.00	100.00		4.00	3.99	99.00
	5.00	5.10	101.32		4.00	4.96	99.68
	10.00	9.97	99.70		5.00	10.03	99.25
			99.49±0.90		10.00	10.03	100.30
							100.73±1.44

Table S2. Recovery results of the proposed method for the analysis of four compounds in spiked cucumber and soil samples

Name of Compound	Added (µg/g)	Recovery % (Cuc.)	Recovery % (Soil)	Name of Compound	Added (µg/g)	Recovery % (Cuc.)	Recovery % (Soil)
1-methyl 3-nitroguanidine	0.10	100.00	100.00	Thiamethoxam	0.30	100.00	100.00
	0.30	98.00	100.00		0.50	100.00	102.76
	1.00	100.00	101.00		1.00	102.00	99.00
	2.00	101.90	98.75		3.00	100.00	98.92
	3.00	99.03	100.77		5.00	99.19	100.48
	5.00	100.00	100.00		10.00	100.20	100.00
		99.52±1.40	100.38±1.44			100.41±0.90	100.49±1.46
Dinotefuran	0.10	100.00	100.00	Clothianidin	0.30	100.00	100.00
	0.30	98.20	102.90		0.50	98.22	100.00
	1.00	98.31	101.00		1.00	102.00	100.00
	3.00	101.99	98.19		3.00	100.75	98.82
	5.00	99.25	100.68		5.00	99.04	101.29
	10.00	100.00	100.00		10.00	100.20	99.79
		99.19±1.65	100.47±1.62			100.00±1.28	99.68±0.89

Table S3. Recovery results of the proposed method for the analysis of commercial formulations of the three neonicotinoids

Name of Compound	Taken (µg/ml)	Found (µg/ml)	Recovery %
Dinotefuran Oshin® (20 % SG)	0.50	0.49	98.00
	1.00	0.99	99.00
	5.00	5.01	100.20
			99.07±1.10
Thiamethoxam Actara® (25 % WG)	0.50	0.51	102.00
	1.00	1.01	101.00
	5.00	5.00	100.00
			101.00±1.00
Clothianidin Clothianidin® (50% WDG)	0.50	0.50	100.00
	1.00	0.98	98.00
	5.00	4.99	99.80
			99.27±1.10

Table S4. Retention times for the four compounds in pure and spiked cucumber and soil samples.

Name of Compound	Concentration	Retention time in pure	Retention time in cucumbers	Retention time in soil
1-methyl 3-nitroguanidine	0.10	6	5.86	5.85
	1.00	5.85	6.05	5.84
	2.00	6.03	5.98	5.95
	3.00	5.96	5.93	5.85
1-methyl 3-nitroguanidine	5.00	5.91	5.74	5.83
	tR±S.D	5.95 ±0.07	5.86 ±0.05	5.91 ±0.12
	RSD %	1.18	0.85	2.03
Dinotefuran	0.10	8.73	8.57	8.78
	1.00	8.79	8.89	8.86
	3.00	8.84	8.76	8.70
	5.00	8.72	8.69	8.56
Dinotefuran	10.00	8.77	8.85	8.52
	tR±S.D	8.77 ±0.05	8.75 ±0.13	8.68 ±0.14
	RSD %	0.57	1.51	1.61
Thiamethoxam	0.30	11.27	10.98	11.17
	1.00	11.16	11.28	11.26
	3.00	11.23	11.15	11.08
	5.00	11.10	11.25	10.96
Thiamethoxam	10.00	11.15	11.07	10.97
	tR±S.D	11.18 ±0.07	11.15 ±0.12	11.09 ±0.13
	RSD %	0.63	1.08	1.17
Clothianidin	0.30	12.67	12.34	12.57
	1.00	12.53	12.73	12.70
	3.00	12.57	12.56	12.46
	5.00	12.49	12.64	12.29
Clothianidin	10.00	12.55	12.74	12.33
	tR±S.D	12.56 ±0.07	12.60 ±0.16	12.47 ±0.17
	RSD %	0.56	1.27	1.36

Table S5. Apparent recoveries of the four compounds in spiked cucumbers and soil samples compared to pure samples (Trueness):

Name of Compound	Spiked level (µg/g)	Recovery % (in cuc.)	Recovery % (in soil)
1-methyl 3-nitroguanidine	0.10	120.26	128.32
	0.30	119.60	123.83
	1.00	102.28	105.19
	2.00	97.15	96.29
	3.00	92.27	95.70
	5.00	91.29	93.00
		103.81±13.09	107.05±15.36
Dinotefuran	0.10	88.48	75.41
	0.30	80.83	77.73
	1.00	78.02	87.03
	3.00	80.07	87.11
	5.00	77.76	89.96
	10.00	78.24	89.78
		80.56±4.07	84.50±6.31
Thiamethoxam	0.30	78.44	82.68
	0.50	71.32	86.30
	1.00	72.70	85.11
	3.00	81.31	86.12
	5.00	76.86	87.75
	10.00	70.93	87.49
		75.26±4.24	85.91±1.85
Clothianidin	0.30	74.41	70.80
	0.50	73.07	77.57
	1.00	72.39	83.05
	3.00	73.77	85.41
	5.00	72.95	88.24
	10.00	74.11	87.41
		73.45±0.77	82.08±6.72

Table S6. Comparison between the results of HPLC method for the determination of the three neonicotinoids in Cucumbers and the results of other reported method ²²

Item	Dinotefuran		Thiamethoxam		Clothianidin	
	The Proposed HPLC method	Reported HPLC method	The Proposed HPLC method	Reported HPLC method	The Proposed HPLC method	Reported HPLC method
Mean	99.19	99.54	100.41	99.92	100.00	100.73
S.D	1.65	2.03	0.90	1.23	1.28	1.80
Variance	2.72	4.12	0.81	1.51	1.64	3.24
Correlation coefficient (r)	r ² =0.9995	r ² =0.9996	r ² =0.9999	r ² =0.9999	r ² =0.9997	r ² =0.9999
n	6	5	6	5	6	5
t	0.17 (2.26)	--	-0.16 (2.26)	--	0.21 (2.26)	--
F	1.51 (5.19)	--	1.86 (5.19)	--	1.98 (5.19)	--

Reported method ²²: HPLC method using gradient elution of methanol: water & 1 ml/min flow rate .