

Supplementary information

Analysis Method Development and Health Risk Assessment of Pesticide and Heavy Metal Residues in *Dendrobium Candidum*

Zihan Zhang^{a,1}, Jiajin Song^{a,1}, Houpu Zhang^a, Zhiruo Zheng^a, Tongxin Li^a, Shenggan Wu^e,
Bowe He^d, Bizeng Mao^{*,b,c}, Yunlong Yu^{a,c}, Hua Fang^{*,a,c}

^a *Institute of Pesticide and Environmental Toxicology, College of Agriculture & Biotechnology, Zhejiang University, Hangzhou 310058, China*

^b *Institute of Biotechnology, College of Agriculture & Biotechnology, Zhejiang University, Hangzhou 310058, China*

^c *Key Laboratory of Molecular Biology of Crop Pathogens and Insects, Ministry of Agriculture, Zhejiang Provincial Key Laboratory of Biology of Crop Pathogens and Insects, Zhejiang University, Hangzhou 310058, China*

^d *Agricultural Technology Extension Center of Zhejiang Province, Hangzhou, 310020, China*

^e *Institute of Quality and Standard of Agro-Products, Zhejiang Academy of Agricultural Sciences, Hangzhou 310021, China*

*For correspondence.

E-mail: agri@zju.edu.cn, maobz@zju.edu.cn

Tel/Fax: (+86-571-88982810)

¹ Equal contribution

Table legends

Table S1 Collection information of *Dendrobium candidum* samples

Table S2 The optimum instrumental operating conditions for ICP-MS

Table S3 Pesticide residues in *Dendrobium candidum*

Table S1 Collection information of *Dendrobium candidum* samples

Tag	Sampling location	Sampling time
YLB	Xianju, Zhejiang	2019.01
WC	Linan, Zhejiang	2019.01
HQ	Tonglu, Zhejiang	2019.01
LXX	Jiande, Zhejiang	2019.01
SY-1	Wujiang, Jiangsu	2019.01
WZTD	Longquan, Zhejiang	2019.01
KEB	Puer, Yunnan	2019.01
SXG	Wuyi, Zhejiang	2019.01
TH	Taizhou, Zhejiang	2019.01
GXS	Nanning, Guangxi	2019.01
WZTY	Longquan, Zhejiang	2019.01
GXL	Nanning, Guangxi	2019.01
HQYT	Tonglu, Zhejiang	2019.01
YLB-2	Xianju, Zhejiang	2019.01
WZTX	Longquan, Zhejiang	2019.01
XRL	Menghai, Yunnan	2019.01
DP	Hangzhou, Zhejiang	2019.01
SY-2	Wujiang, Jiangsu	2019.01
SY	Wujiang, jiangsu	2019.01
NB	Ningbo, Zhejiang	2019.01
GXD	Nanjing, Guangxi	2019.01
WJX-W	Wenzhou, Zhejiang	2019.01
XRC	Menghai, Yunnan	2019.01
TFTS	Wenzhou, Zhejiang	2019.01
TFTH	Wenzhou, Zhejiang	2019.01
H1	Wenzhou, Zhejiang	2019.01
H6	Wenzhou, Zhejiang	2019.01

Table S2 The optimum instrumental operating conditions for ICP-MS

Conditions	Values
RF power	1200W
Plasma gas	13 L/min Ar
Auxiliary gas	0.70 L/min Ar
Nebulizer pressure	0.9 bar
Number of scans	60
Nebulizer	Concentric nebulizer
Sampler cone	Nickel 1.0 mm orifice diameter
Skimmer cone	Nickel 0.7 mm orifice diameter
Detection method	Pulse and analog counting
Scanning method	Peak jump
Peristaltic pump speed	30 rpm
Number of detection points per peak	3
Repeat times	3

Table S3-1 Pesticide residues in *Dendrobium candidum*

Pesticide	YLB		WC		HQ		LXX		SY-1		WZTD		MRL μg/kg
	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	
Dichlorvos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Refer to root vegetables)
α-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
β-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
γ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
δ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chlorothalonil	0.18	1.65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10000(Refer to tea)
Chlorpyrifos	ND	ND	0.10	1.96	ND	ND	ND	ND	ND	ND	ND	ND	2000(Refer to tea)
Isocarbophos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50(Refer to tea)
p,p'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
p,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Fenpropathrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	1.69	50000Refer to tea)
λ-cyhalothrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15000(Refer to tea)
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20000(Refer to tea)
Difenoconazole	ND	ND	ND	ND	0.11	3.51	ND	ND	ND	ND	ND	ND	500(Refer to ginseng)
Azoxystrobin	ND	ND	ND	ND	ND	ND	0.23	17.70	ND	ND	0.39	14.13	1000(Refer to ginseng)
Carbendazim	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000(Refer to Panax notoginseng)
Thiophanate-methyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to tea)
Chlorantraniliprole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	233.33	4.68	500(Refer to radish)
Tebuconazole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3000(Refer to Panax notoginseng)
Procymidone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to edible fungi)
Prochloraz	ND	ND	76.24	13.39	103.27	8.37	30.76	4.12	ND	ND	ND	ND	15000(Refer to Dendrobium)
Pyraclostrobin	ND	ND	ND	ND	67.92	11.09	ND	ND	ND	ND	ND	ND	10000(Refer to tea)

ND means not detected

Table S3-2 Pesticide residues in *Dendrobium candidum*

Pesticide	KEB		SXG		TH		GXS		WZTY		GXL		MRL
	Mean	RSD	Mean	RSD	Mean	RSD	mg/kg	RSD	Mean	RSD	Mean	RSD	μg/kg
Dichlorvos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Refer to root vegetables)
α-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
β-BHC	ND	ND	0.11	3.33	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
γ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
δ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chlorothalonil	ND	ND	0.26	2.31	ND	ND	ND	ND	ND	ND	ND	ND	10000(Refer to tea)
Chlorpyrifos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2000(Refer to tea)
Isocarbophos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50(Refer to tea)
p,p'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
p,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Fenpropathrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to tea)
λ-cyhalothrin	ND	ND	ND	ND	ND	ND	ND	ND	0.23	1.21	ND	ND	15000(Refer to tea)
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20000(Refer to tea)
Difenoconazole	ND	ND	ND	ND	ND	ND	0.36	8.21	ND	ND	0.34	14.83	500(Refer to ginseng)
Azoxystrobin	0.20	11.50	ND	ND	ND	ND	ND	ND	0.74	4.63	ND	ND	1000(Refer to ginseng)
Carbendazim	ND	ND	ND	ND	ND	ND	ND	ND	3.16	10.76	2.92	7.44	1000(Refer to Panax notoginseng)
Thiophanate-methyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to tea)
Chlorantraniliprole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500(Refer to radish)
Tebuconazole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3000(Refer to Panax notoginseng)
Procymidone	ND	ND	ND	ND	ND	ND	312.83	6.36	ND	ND	20.06	8.59	5000(Refer to edible fungi)
Prochloraz	27.69	0.87	ND	ND	ND	ND	128.40	12.98	84.28	5.28	ND	ND	15000(Refer to Dendrobium)
Pyraclostrobin	3.42	9.12	77.38	7.23	3.78	5.22	27.68	2.25	16.83	5.57	12.98	3.87	10000(Refer to tea)

ND means no detected

Table S3-3 Pesticide residues in *Dendrobium candidum*

Pesticide	HQYT		YLB-2		WZTX		XRL		DP		SY-2		MRL
	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	Mean	RSD	µg/kg
Dichlorvos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Refer to root vegetables)
α-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
β-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
γ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
δ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chlorothalonil	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10000(Refer to tea)
Chlorpyrifos	ND	ND	ND	ND	ND	ND	0.07	2.15	ND	ND	ND	ND	2000(Refer to tea)
Isocarbofos	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50(Refer to tea)
p,p'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200(Traditional Chinese medicine)
p,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Fenpropathrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to tea)
λ-cyhalothrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15000(Refer to tea)
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20000(Refer to tea)
Difenoconazole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500(Refer to ginseng)
Azoxystrobin	ND	ND	ND	ND	0.40	4.12	0.46	15.94	ND	ND	ND	ND	1000(Refer to ginseng)
Carbendazim	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000(Refer to Panax notoginseng)
Thiophanate-methyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to tea)
Chlorantraniliprole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	48.29	7.36	500(Refer to radish)
Tebuconazole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3000(Refer to Panax notoginseng)
Procymidone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5000(Refer to edible fungi)
Prochloraz	ND	ND	ND	ND	47.65	12.11	ND	ND	145.29	4.29	10.28	0.82	15000(Refer to Dendrobium)
Pyraclostrobin	ND	ND	ND	ND	211.84	3.67	ND	ND	ND	ND	ND	ND	10000(Refer to tea)

ND means not detected