

*Supplementary materials for*

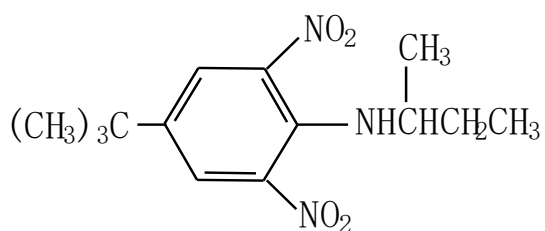
## **Establish the HPLC-MS/MS method for monitoring the residue, degradation of butralin under field and risk assessment**

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**Figure S1.** Chemical structure of butralin.

**Table S1.** The MRM for analysis of butralin.

Compound	Ion source	Retention time	Precursor ion	Quantification ion (CE <sup>a</sup> )	Confirmation ion (CE <sup>a</sup> )	Fragmentor
Butralin	ESI+	5.84	296.2	240.2(12)	222.2 (23)	70

<sup>a</sup> collision energy (eV) is given in parentheses.

**Table S2.** The parameters for the ESI source in HPLC-MS/MS.

Parameters	Positive mode
Nebulizer pressure (psi)	30
Capillary voltage (kV)	4.0
Nozzle voltage (kV)	0.5
Desolvation flow rates <sup>a</sup> (L/min)	7
Sheath gas flow rates (L/min)	8
Desolvation temperature (°C)	300
Source temperature (°C)	300

<sup>a</sup> Desolvation (L/min) is the drying gas.

**Table S3.** Linear equation and matrix effect of butralin in different ginseng matrices.

Pesticide	Matrix	Linear equation (y)	Correlation coefficient (r)	p-Value	Matrix effect
Butralin	Acetonitrile	$1.5 \times 10^7x - 51992$	0.9996	<0.0001	-
	Ginseng	$3.6 \times 10^7x - 164731$	0.9986	<0.0001	2.4
	Dried ginseng	$4.4 \times 10^7x - 26594$	0.9997	<0.0001	2.9
	Ginseng plant	$5.0 \times 10^7x - 484887$	0.9979	<0.0001	3.3
	Ginseng soil	$4.9 \times 10^7x - 332568$	0.9993	<0.0001	2.2

**Table S4.** Recovery and RSD (n=5) of butralin in ginseng.

Matrix	Spiked level(mg/kg)	Mean Recovery (%)	RSD (%)
Ginseng	0.01	107.5	1.4
	0.05	105.2	2.3
	0.5	97.6	1.6
Dried ginseng	0.01	93.1	6.4
	0.05	97.3	1.1
	0.5	97.5	0.7
Ginseng plant	0.01	97.9	2.5
	0.05	105.9	1.4
	0.5	94.1	1.2
	10.0	98.3	1.5
Ginseng soil	0.01	103	0.8
	0.05	99.7	5.6
	0.5	106.9	2.2
	10.0	95.2	1.1

**Table S5.** The long-term dietary intake risk assessment of butralin based on the Chinese dietary pattern.

Food category	FI	Commodity	MRLs <sup>b</sup>	STMR <sup>b</sup>	Source of reference limit
Rice cereals and rice products	0.2399	Rice	0.05		China
Wheat cereals and wheat products	0.1385				
Other cereal grains	0.0233				
Potatos	0.0495	Beans (dry)	0.02		China
Dried beans and their products	0.016				
Dark-colored vegetables	0.0915				
Light-colored vegetables	0.1837				
Pickles	0.0103	Tomatoes	0.01		EU
Fruits	0.0457				
Nuts	0.0039				
Livestocks and poultries	0.0795				
Milk and milk products	0.0263	Eggplant			
Egg and egg products	0.0236				
Fish and fishproducts	0.0301				
Oilseeds and oil	0.0327				
Animal origin oil and fat	0.0087	Cotton seed	0.05		China
Sugars and starch	0.0044				
Salt	0.012				
Soy sauce	0.009				
	1.0286	Ginseng		0.013	
Total FI (kg day <sup>-1</sup> ) <sup>a</sup>					
Total NEDI (mg)	0.0251				
ADI (mg/kg bw)	0.2				
Body weight (kg bw)	63				
%ADI (%)	0.2%				

<sup>a</sup> The consumption values of ginseng and other crops referred to the recommended dietary food intake (FI) of an adult (63 kg) per day for its corresponding food classification (data from the dietary guideline published by Health Ministry of the People's Republic of China).

<sup>b</sup> The supervised trials median residue (STMR) in ginseng and the maximum residue limits (MRLs) in other crops were used to calculate the national estimated daily intake (NEDI). The high residue (HR) in ginseng was used to calculate the national estimated short-term intake (NESTI).