

植物源性食品中 208 种农药及其代谢物残留量的测定

-简略版

SGL-GCMS-004

摘要：建立了植物源性食品中 208 种农药及其代谢物残留量同时测定的方法。本应用按照新国标方法，采用岛津 SHIMSEN QuEChERS 产品对梨、韭菜、大米、茶叶 4 类样品基质进行净化，同时采用岛津气相色谱串联质谱 GCMS-TQ8050, 岛津 SH-1701 色谱柱进行分析，回收率及重现性良好。该方法前处理速度快，重现性好，灵敏度高，适用于梨、韭菜、茶叶和 大米等植物源性食品基质中多种农药残留的同时检测。

关键词：QuEChERS 多农残 植物源性食品 GC-MS/MS

1. 实验部分

1.1 实验仪器及耗材

仪器配置：岛津 GCMS-TQ8050 气相色谱-串联质谱联用仪；

耗材方法包：

货号	描述
PRC KIT-001	植物源性食品中多农残测定 GC-MS/MS 法 耗材方法包

本耗材方法包所含明细如下：

品名	描述	货号	数量
SHIMSEN QuEChERS 提取盐试剂包I	4 g MgSO ₄ , 1 g NaCl, 1 g 柠檬酸钠, 0.5 g 柠檬酸氢二钠 50/p	380-00148	1 盒
SHIMSEN QuEChERS 提取盐试剂包II	6 g MgSO ₄ , 1.5 g 醋酸钠 50/p	380-00151	1 盒
SHIMSEN QuEChERS 净化管I	150 mg PSA, 900 mg MgSO ₄ 50/p	380-00123	1 盒
SHIMSEN QuEChERS 净化管II	150 mg PSA, 15mg GC-e, 885 mg MgSO ₄ 50/p	380-00124	1 盒
SHIMSEN QuEChERS 净化管III	400mg PSA, 400mg C18, 1200 mg MgSO ₄ 50/p	380-00129	1 盒
SHIMSEN QuEChERS 净化管IV	400mg PSA, 400 mg C18, 200mg GC-e, 1200 mg MgSO ₄ 50/p	380-00145	1 盒

陶瓷均质子	50ml陶瓷均质子 100个/袋	5010-009903	1袋
陶瓷均质子	15ml陶瓷均质子 100个/袋	5010-009902	1袋
气相毛细柱	SH-1701 0.25mmx30m DF=0.25um	221-75777-30	1支
样品瓶	LabTotal Vial Certified Kit 1.5ml(100pcs) for GC/GCMS	227-34002-01	1盒
针头滤器	SHIMSEN Arc Disc HPTFE针 头滤器 HPTFE/B 直径:13mm, 孔 径:0.22um, 100只/包	380-00341-05	1盒
详细操作说明书一份（随货附二维码，扫码可得）			
详细操作视频（随货附二维码，扫码可得）			

SHIMSEN Pipet 移液枪: SHIMSEN Pipet PMII-10 (P/N: 380-00751-02);

SHIMSEN Pipet PMII-100 (P/N: 380-00751-04);

SHIMSEN Pipet PMII-1000 (P/N: 380-00751-06)。

1.2 分析条件

1.2.1 色谱条件:

毛细管柱: SH-1701 毛细管柱 (30m* 0.25mm *0.25 μ m)

程序升温: 初始温度 40 $^{\circ}$ C 保持 1 min, 以 40 $^{\circ}$ C/min 升温到 120 $^{\circ}$ C, 再以 5 $^{\circ}$ C/min 升温到 240 $^{\circ}$ C, 以 12 $^{\circ}$ C/min 升温到 300 $^{\circ}$ C, 保持 10 min;

载气: He

流速: 1.0ml/min

进样口温度: 280 $^{\circ}$ C

进样量: 1 μ L

进样方式: 不分流进样

1.2.2 质谱条件:

电离模式: 电子轰击电离 (EI);

电子轰击能量: 70 eV

离子源温度: 230 $^{\circ}$ C

接口温度: 280 $^{\circ}$ C

溶剂延迟: 3min

数据采集模式: MRM

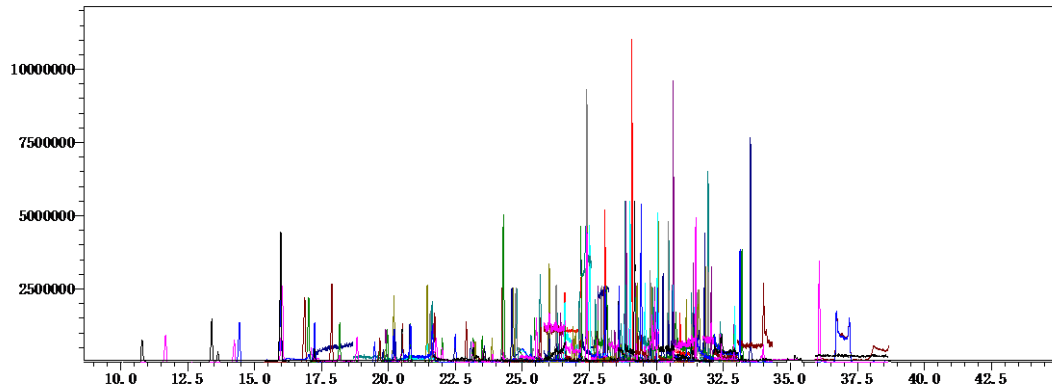
各化合物 MRM 参数略

1.3 样品前处理

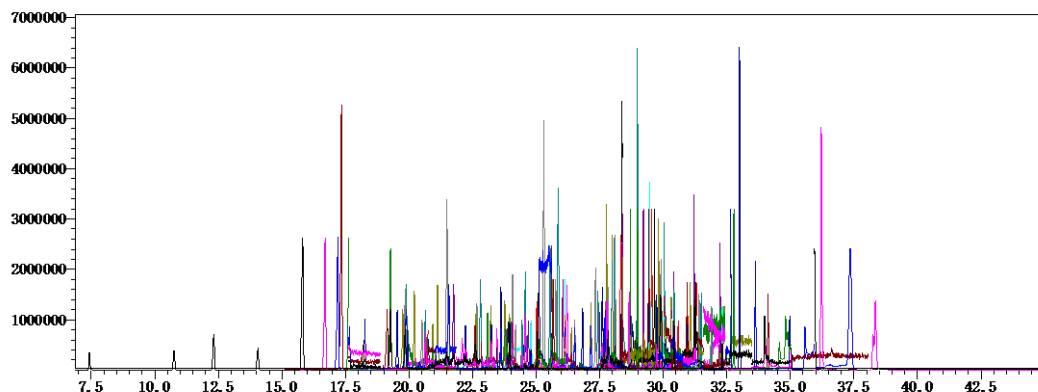
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2. 结果及讨论

2.1 标准品的总离子流色谱图



109 种农药混合标准品的总离子流色谱图



113 种农药混合标准品的总离子流色谱图

2.2 植物源性食品中 208 种农药及其代谢物的 GC-MS/MS 检测添加回收结果

将梨、韭菜空白样品进行 40.0 $\mu\text{g}/\text{kg}$ 浓度加标; 大米空白样品进行 100.0 $\mu\text{g}/\text{kg}$ 浓度加标; 茶叶空白样品进行 250.0 $\mu\text{g}/\text{kg}$ 浓度加标后, 按照上述前处理方法处理后上机, 平行 3 份样品考察回收率和 RSD, 具体结果如下: 梨样品加标回收率为 73.75%-124.82%, RSD 为 0.11%-9.60%; 韭菜样品加标回收率为 76.47%-125.81%, RSD 为 0.05%-11.66%; 茶叶样品加标回收率为 60.24%-112.83%, RSD 为 0.39%-22.65%; 大米样品加标回收率为 66.61%-118.60%, RSD 为 0.38%-14.62%。

序号	化合物	梨		韭菜		茶叶		大米	
		添加水平(40µg/kg)		添加水平(40µg/kg)		添加水平(250µg/kg)		添加水平(100µg/kg)	
		回收率 (%)	RSD (%)	回收率 (%)	RSD (%)	回收率 (%)	RSD (%)	回收率 (%)	RSD (%)
A 组 (109 种)									
1	敌敌畏	115.38%	3.98%	117.33%	4.24%	107.90%	3.40%	102.32%	2.94%
2	甲胺磷	73.75%	0.49%	84.55%	2.95%	90.71%	7.49%	90.77%	2.86%
3	敌草腈	98.32%	3.50%	99.44%	2.29%	93.22%	4.93%	90.69%	2.47%
4	速灭磷-1	104.02%	3.39%	100.63%	2.96%	96.88%	1.66%	98.26%	2.44%
5	速灭磷-2	108.49%	2.00%	100.15%	3.96%	98.25%	2.91%	95.80%	2.33%
6	虫螨畏	104.74%	2.22%	95.64%	4.03%	96.59%	3.16%	97.30%	2.94%
7	禾草敌	105.34%	0.90%	96.52%	3.54%	91.45%	3.71%	91.33%	2.67%
8	乙酰甲胺磷	118.44%	5.73%	94.66%	3.44%	94.81%	8.98%	98.76%	1.57%
9	异丙威	104.61%	2.99%	100.33%	2.57%	99.60%	6.35%	94.91%	2.88%
10	环草敌	102.41%	3.25%	98.27%	2.39%	84.87%	6.80%	91.89%	2.51%
11	六氯苯	103.85%	2.75%	91.10%	3.15%	60.24%	4.86%	83.54%	2.87%
12	灭线磷	108.61%	2.65%	97.98%	3.89%	92.02%	4.16%	99.22%	2.57%
13	乙丁烯氟灵	110.50%	2.69%	108.44%	1.92%	93.29%	4.24%	108.44%	2.88%
14	残杀威	112.65%	0.61%	98.42%	3.88%	90.17%	6.57%	77.56%	6.98%
15	治螟磷	106.57%	2.47%	99.86%	2.62%	96.55%	4.48%	99.89%	2.34%
16	alpha-六六六	107.01%	2.83%	100.95%	2.16%	91.30%	4.68%	97.41%	2.09%
17	脱乙基莠去津	105.01%	2.26%	104.53%	2.83%	86.35%	15.51%	96.91%	2.94%
18	特丁硫磷	106.25%	3.50%	101.89%	3.19%	89.32%	4.40%	110.46%	3.42%
19	敌恶磷	104.01%	2.92%	101.05%	5.94%	87.62%	3.63%	110.42%	2.94%
20	环丙氟灵	113.93%	2.18%	109.43%	2.72%	93.93%	4.48%	106.62%	2.57%
21	野麦畏	107.14%	3.54%	99.67%	1.88%	84.30%	3.79%	94.28%	2.75%
22	地虫硫磷	106.74%	2.80%	99.07%	2.83%	91.29%	4.94%	97.38%	2.84%
23	丁基嘧啶磷	107.88%	2.78%	99.72%	1.66%	89.84%	3.15%	96.97%	2.46%
24	扑灭津	107.99%	3.09%	99.20%	2.37%	81.96%	9.36%	100.07%	3.18%
25	氯硝胺	111.41%	2.20%	102.47%	2.61%	83.66%	5.95%	111.84%	1.06%
26	胺丙畏	107.51%	3.08%	98.20%	3.30%	93.97%	4.47%	101.58%	3.64%
27	异稻瘟净	108.81%	1.99%	98.60%	2.99%	89.09%	2.48%	101.78%	2.89%
28	久效磷	102.80%	1.13%	94.25%	4.48%	94.12%	2.81%	98.69%	3.06%
29	除线磷	106.58%	2.73%	98.22%	2.87%	87.88%	4.45%	96.89%	2.22%
30	抗蚜威	106.95%	3.58%	97.69%	3.49%	82.56%	6.69%	98.62%	2.66%
31	乐果	114.69%	0.48%	97.76%	3.15%	112.83%	1.04%	108.07%	5.48%
32	乙草胺	107.47%	4.49%	102.70%	2.18%	94.23%	5.42%	97.21%	4.54%
33	甲草胺	110.63%	3.29%	101.01%	3.19%	89.01%	6.37%	99.29%	2.15%
34	甲基对氧磷	113.65%	1.98%	92.77%	10.60%	96.14%	4.35%	101.79%	2.77%
35	甲基嘧啶磷	108.43%	3.86%	97.09%	1.43%	89.02%	2.44%	97.38%	3.34%
36	乙烯菌核利	104.19%	7.44%	99.51%	2.89%	91.38%	2.67%	88.54%	0.89%

37	噻草酮	105.64%	4.10%	99.26%	1.23%	97.51%	5.84%	95.18%	0.41%
38	甲霜灵	101.99%	8.04%	100.60%	3.61%	92.47%	6.36%	94.58%	7.18%
39	禾草丹	98.92%	5.56%	99.36%	2.81%	84.54%	3.69%	88.86%	2.80%
40	安硫磷	101.43%	9.60%	87.79%	1.71%	88.97%	8.41%	86.94%	2.79%
41	异丙甲草胺	108.80%	2.78%	102.39%	2.06%	86.30%	5.83%	99.52%	2.66%
42	三氯杀螨醇分解物	104.82%	2.63%	111.92%	6.70%	87.32%	9.68%	85.20%	3.56%
43	倍硫磷	99.65%	3.34%	99.85%	3.40%	83.59%	4.49%	87.20%	5.46%
44	对氧磷	108.50%	4.21%	94.03%	3.15%	100.92%	8.28%	94.58%	2.82%
45	溴硫磷	103.94%	5.17%	90.67%	3.20%	82.47%	1.21%	91.34%	1.35%
46	三唑酮	103.04%	3.17%	106.60%	1.82%	91.07%	4.15%	98.93%	3.22%
47	生物烯丙菊酯	100.69%	3.14%	110.07%	7.84%	86.19%	12.15%	90.46%	2.47%
48	对硫磷	116.34%	1.66%	109.46%	1.22%	92.55%	4.38%	118.37%	2.17%
49	甲基异柳磷	102.28%	2.88%	101.87%	1.82%	91.22%	4.10%	98.02%	1.52%
50	异柳磷	108.12%	3.00%	100.44%	1.75%	91.34%	6.32%	100.25%	2.40%
51	啶硫磷	100.54%	3.16%	98.89%	3.48%	79.15%	1.22%	88.32%	1.95%
52	alpha-硫丹	104.26%	4.95%	104.33%	5.69%	87.70%	7.64%	96.55%	5.16%
53	戊菌唑	101.25%	2.76%	100.39%	2.57%	85.74%	4.53%	91.29%	3.30%
54	甲拌磷亚砷	102.71%	2.53%	101.34%	3.80%	92.40%	3.43%	93.40%	4.33%
55	噻唑膦-1	113.72%	3.01%	98.46%	3.46%	99.15%	5.34%	94.33%	6.09%
56	噻唑膦-2	111.61%	5.03%	99.84%	3.77%	95.80%	0.39%	88.07%	6.28%
57	p,p'-DDE	102.57%	2.80%	100.23%	2.12%	73.76%	4.44%	86.80%	1.66%
58	苯硫威	103.72%	2.58%	100.21%	2.98%	88.48%	4.05%	91.98%	3.73%
59	除草定	79.17%	7.78%	104.55%	1.52%	88.19%	6.88%	78.90%	4.44%
60	特丁硫磷砷	107.87%	3.40%	100.19%	2.38%	94.26%	1.21%	99.05%	3.93%
61	甲拌磷砷	108.23%	3.12%	101.14%	2.39%	94.32%	3.37%	96.82%	2.20%
62	噻菌胺	101.08%	2.64%	97.12%	3.55%	79.52%	2.58%	97.01%	3.85%
63	脱叶磷	105.82%	2.60%	98.79%	2.89%	76.82%	4.10%	92.73%	0.60%
64	三唑醇-1	100.23%	2.06%	102.31%	3.23%	83.69%	6.36%	89.36%	5.83%
65	溴苯烯磷	103.63%	2.99%	102.46%	2.40%	92.63%	3.66%	98.66%	2.86%
66	丙草胺	105.14%	2.37%	103.16%	3.27%	91.71%	5.50%	97.42%	4.43%
67	三唑醇-2	112.65%	0.28%	109.48%	5.48%	88.41%	6.44%	95.99%	4.83%
68	噁草酮	105.68%	1.76%	101.38%	1.77%	91.14%	4.46%	95.48%	4.18%
69	o,p'-DDD	99.48%	3.47%	103.63%	2.40%	72.61%	5.81%	93.91%	3.24%
70	醚菌酯	105.05%	3.01%	98.03%	2.95%	92.15%	5.08%	100.99%	3.63%
71	灭菌磷	88.81%	5.07%	78.10%	8.96%	78.46%	6.27%	84.03%	5.08%
72	异狄氏剂	104.93%	5.42%	97.33%	0.33%	92.30%	2.50%	94.58%	2.16%
73	抑霉唑	102.46%	3.67%	91.09%	4.52%	---2	---2	88.32%	4.00%
74	o,p'-DDT	117.20%	4.42%	76.76%	6.20%	74.54%	10.09%	66.61%	5.56%
75	地胺磷	108.64%	2.12%	97.43%	3.36%	89.42%	7.54%	107.97%	3.78%
76	环氟菌胺	109.55%	1.13%	102.38%	4.46%	101.54%	6.30%	87.76%	5.35%
77	乙嘧酚磺酸酯	104.37%	2.20%	98.25%	2.35%	77.42%	11.84%	94.48%	2.50%
78	虫螨磷-1	106.53%	3.19%	100.77%	3.43%	88.21%	2.14%	94.73%	2.49%

79	乙氧氟草醚	111.08%	1.54%	111.51%	0.89%	96.99%	2.72%	114.88%	2.89%
80	氟酰胺	103.99%	3.48%	103.35%	2.43%	93.56%	5.03%	97.26%	3.45%
81	虫螨磷-2	109.14%	3.37%	99.63%	3.89%	87.89%	2.77%	92.22%	2.81%
82	p,p'-DDD	100.00%	3.26%	102.18%	2.35%	78.75%	5.95%	88.62%	2.48%
83	beta-硫丹	105.18%	3.13%	101.81%	3.22%	82.96%	12.28%	92.73%	2.62%
84	啶氧灵	106.07%	2.98%	98.23%	2.72%	63.99%	16.80%	93.26%	3.52%
85	脲菌酯	109.52%	2.80%	98.79%	2.07%	92.29%	1.77%	104.48%	2.81%
86	苯草醚	118.04%	2.08%	108.18%	1.41%	81.74%	2.97%	113.18%	2.20%
87	三硫磷	111.27%	2.71%	98.18%	1.71%	85.22%	3.44%	99.15%	3.79%
88	恶唑磷	102.47%	3.43%	99.14%	3.27%	79.46%	1.86%	92.42%	1.67%
89	增效醚	107.63%	2.98%	100.56%	3.00%	80.90%	4.15%	97.04%	3.65%
90	敌瘟磷	107.33%	2.46%	92.68%	4.21%	93.55%	3.78%	86.54%	5.38%
91	丰索磷	111.81%	2.43%	98.80%	2.41%	91.19%	4.53%	106.80%	2.58%
92	三唑磷	101.31%	1.60%	91.71%	11.11%	92.17%	4.92%	95.16%	1.71%
93	联苯菊酯	106.09%	2.77%	---	---	85.34%	3.12%	92.76%	3.21%
94	吡螨胺	105.78%	2.95%	101.01%	2.98%	89.20%	3.94%	97.02%	3.61%
95	溴螨酯	104.56%	3.44%	100.88%	2.67%	89.36%	3.26%	93.29%	1.64%
96	胺菊酯-1	108.22%	5.98%	97.51%	2.73%	85.93%	2.93%	99.97%	1.20%
97	氟环唑	107.31%	1.54%	104.50%	2.07%	86.08%	2.35%	92.72%	3.21%
98	戊唑醇	105.32%	3.72%	100.95%	1.97%	88.51%	3.69%	96.14%	2.95%
99	胺菊酯-2	104.49%	2.34%	99.87%	3.65%	85.79%	3.02%	97.14%	3.59%
100	吡丙醚	103.57%	2.86%	97.92%	2.97%	83.55%	3.06%	98.56%	1.95%
101	啉草磷	108.04%	2.03%	101.90%	2.11%	93.50%	2.95%	101.12%	3.25%
102	苯硫磷	114.94%	1.34%	111.44%	1.00%	91.23%	4.27%	110.25%	1.78%
103	环嗪酮	106.31%	3.11%	99.77%	2.78%	87.54%	22.65%	96.21%	1.68%
104	咪唑菌酮	106.32%	3.32%	101.74%	1.78%	93.85%	3.28%	97.96%	2.37%
105	三氯杀螨砜	106.77%	3.86%	99.95%	1.88%	84.57%	4.33%	96.65%	5.22%
106	莎稗磷	107.77%	2.77%	91.82%	2.64%	97.04%	6.49%	101.94%	3.33%
107	氯菊酯-1	105.87%	3.41%	99.90%	4.58%	94.06%	10.51%	93.66%	0.73%
108	吡菌磷	107.52%	2.57%	92.89%	2.44%	93.03%	1.55%	100.82%	2.54%
109	氯菊酯-2	102.52%	3.08%	99.56%	1.93%	81.58%	5.22%	94.14%	5.19%
110	氯苯嘧啶醇	106.27%	3.10%	98.26%	2.40%	86.86%	1.69%	95.92%	2.91%
111	哒螨灵	106.42%	2.64%	103.05%	2.39%	82.25%	4.69%	96.38%	2.80%
112	氯氰菊酯-1	108.49%	2.67%	103.47%	2.66%	93.91%	2.43%	96.05%	2.71%
113	氯氰菊酯-2	108.21%	4.96%	112.83%	5.67%	98.19%	3.01%	96.88%	8.82%
114	氯氰菊酯-3	113.75%	6.81%	122.11%	3.25%	94.27%	2.05%	93.86%	13.55%
115	氯氰菊酯-4	117.23%	2.36%	125.81%	3.24%	97.44%	3.94%	89.03%	5.94%
116	啶酰菌胺	106.04%	2.89%	106.81%	0.47%	77.85%	12.98%	95.27%	4.19%
117	氰戊菊酯-1	115.79%	2.04%	108.14%	1.83%	90.66%	5.39%	92.99%	4.29%
118	氰戊菊酯-2	108.62%	1.35%	114.76%	3.29%	91.60%	1.70%	89.25%	3.58%
119	溴氰菊酯-1	101.86%	5.30%	---	---	90.84%	40.49%	91.12%	5.63%
120	溴氰菊酯-2	106.61%	2.10%	134.98%	4.76%	95.78%	8.66%	87.54%	9.61%

B组 (113种)

1	硫草敌	92.04%	2.21%	87.18%	4.20%	89.54%	5.68%	91.93%	7.30%
2	联苯	97.83%	1.14%	90.37%	2.96%	80.11%	4.42%	88.71%	4.79%
3	土菌灵	114.06%	1.47%	90.39%	2.54%	89.28%	4.48%	72.05%	1.87%
4	氯苯甲醚	104.92%	2.24%	94.96%	2.33%	88.39%	4.25%	96.31%	2.57%
5	四氯硝基苯	106.28%	1.78%	97.02%	2.20%	81.25%	3.54%	103.06%	2.74%
6	虫线磷	107.65%	1.98%	102.69%	1.36%	92.26%	4.90%	101.41%	1.46%
7	二苯胺	105.89%	3.02%	100.49%	0.35%	88.57%	7.53%	75.19%	0.51%
8	仲丁威	107.96%	2.04%	98.24%	1.79%	92.34%	5.79%	94.01%	1.32%
9	乙丁氟灵	110.86%	2.98%	105.75%	1.17%	87.49%	4.85%	106.77%	2.54%
10	二溴磷	98.68%	6.66%	---	---	---	---	86.78%	2.67%
11	甲拌磷	106.36%	2.09%	99.71%	0.81%	84.77%	5.40%	108.73%	1.83%
12	氯苯胺灵	105.75%	2.00%	103.51%	2.11%	89.72%	4.86%	100.41%	0.89%
13	五氯硝基苯	110.43%	2.88%	99.30%	1.98%	73.19%	7.73%	102.71%	3.20%
14	氧乐果	91.43%	0.93%	84.23%	9.01%	101.07%	11.87%	82.17%	0.48%
15	阿特拉通	106.81%	1.75%	97.96%	2.34%	77.15%	5.65%	100.76%	0.99%
16	二嗪磷	108.36%	1.81%	98.70%	2.83%	77.64%	6.54%	100.58%	2.07%
17	百治磷	105.19%	0.96%	98.27%	7.36%	88.98%	5.62%	101.65%	1.12%
18	异噁草酮	107.72%	2.60%	96.76%	2.77%	90.94%	5.91%	98.85%	1.83%
19	啉霉胺	107.82%	2.70%	95.90%	4.14%	75.99%	8.82%	99.01%	3.01%
20	gamma-六六六	108.83%	1.93%	97.19%	1.79%	88.19%	5.88%	97.62%	2.82%
21	克百威	114.76%	2.33%	100.70%	3.95%	101.22%	5.64%	53.34%	12.24%
22	乙啉硫磷	108.89%	2.12%	100.44%	2.00%	79.40%	7.83%	99.45%	2.27%
23	莠去津	119.01%	3.29%	97.43%	1.81%	77.09%	12.45%	99.90%	0.90%
24	西玛津	108.26%	3.37%	98.69%	1.53%	71.42%	7.98%	99.41%	1.19%
25	特丁津	109.17%	3.18%	101.86%	2.47%	77.33%	9.89%	98.48%	1.41%
26	氯谷隆	112.27%	2.71%	90.78%	6.94%	63.71%	25.02%	99.59%	1.63%
27	炔苯酰草胺	109.55%	1.88%	101.56%	4.11%	87.97%	4.31%	100.73%	1.62%
28	氯唑磷	106.72%	5.87%	96.61%	4.03%	96.93%	4.30%	104.78%	2.79%
29	五氯苯胺	113.39%	3.20%	96.03%	3.19%	68.67%	5.40%	95.09%	3.90%
30	甲基毒死蜱	102.94%	2.42%	95.31%	3.14%	87.85%	4.80%	100.68%	3.96%
31	艾氏剂	105.80%	3.77%	95.07%	3.28%	70.73%	6.02%	91.88%	2.94%
32	敌草净	112.21%	1.09%	100.57%	2.40%	81.36%	3.05%	95.25%	3.87%
33	皮蝇磷	108.12%	2.06%	92.06%	2.89%	89.19%	4.29%	97.85%	1.16%
34	甲基立枯磷	108.85%	1.48%	100.46%	4.94%	89.03%	5.83%	101.00%	0.93%
35	扑草净	103.86%	4.96%	100.24%	1.92%	84.89%	5.72%	100.25%	0.77%
36	beta-六六六	105.17%	3.02%	99.71%	2.47%	90.49%	3.20%	103.44%	5.20%
37	莠灭净	103.37%	2.54%	100.71%	3.28%	83.92%	5.17%	99.78%	1.34%
38	特丁净	109.34%	2.21%	98.67%	2.21%	78.79%	5.33%	100.65%	0.94%
39	毒死蜱	106.16%	4.84%	99.02%	1.20%	76.89%	8.00%	104.44%	4.50%
40	马拉氧磷	114.25%	2.59%	104.27%	6.21%	---	---	81.83%	2.25%
41	磷胺-1	123.38%	4.24%	101.10%	1.81%	---	---	91.87%	4.77%

42	磷胺-2	103.35%	1.53%	105.00%	4.22%	---	---	97.52%	8.17%
43	异丙净	108.22%	2.45%	101.73%	2.56%	83.78%	3.87%	99.43%	1.56%
44	甲基对硫磷	118.15%	1.15%	100.58%	1.93%	92.48%	5.47%	117.21%	3.82%
45	毒壤磷	108.61%	4.17%	98.59%	3.50%	72.58%	4.95%	96.62%	1.77%
46	delta-六六六	106.23%	1.84%	98.06%	2.34%	91.01%	5.02%	102.16%	1.31%
47	啶啉磷	104.35%	2.27%	101.30%	1.52%	84.96%	2.46%	99.79%	1.49%
48	马拉硫磷	104.89%	0.87%	98.06%	2.77%	93.80%	5.32%	102.03%	5.02%
49	烯虫酯	106.19%	1.92%	---	---	68.25%	6.26%	97.68%	10.80%
50	杀螟硫磷	108.75%	1.49%	99.44%	3.65%	92.63%	3.52%	118.60%	3.75%
51	乙醚呋草黄	103.81%	1.25%	99.07%	1.88%	89.39%	4.79%	100.08%	1.26%
52	啉菌环胺	104.73%	2.39%	97.26%	1.98%	75.99%	3.80%	97.69%	1.22%
53	氧异柳磷	105.57%	1.08%	98.36%	2.06%	87.95%	6.13%	101.41%	0.96%
54	二甲戊灵	111.82%	1.30%	107.92%	2.67%	82.02%	4.67%	107.31%	3.45%
55	(E)-毒虫畏	110.80%	1.78%	87.93%	10.34%	85.75%	5.53%	109.90%	3.99%
56	敌稗	103.47%	3.83%	97.56%	0.98%	83.48%	5.10%	102.74%	2.33%
57	o,p'-DDE	103.99%	2.55%	99.59%	1.80%	74.43%	3.36%	94.31%	3.03%
58	乙基溴硫磷	105.06%	1.40%	98.88%	2.81%	80.09%	3.10%	96.79%	0.78%
59	水胺硫磷	107.97%	4.21%	99.84%	3.42%	92.42%	6.53%	88.26%	3.29%
60	(Z)-毒虫畏	107.35%	2.76%	97.49%	2.78%	88.32%	5.85%	99.60%	1.33%
61	反-氯丹	106.98%	0.11%	99.88%	3.53%	77.69%	3.61%	91.48%	1.37%
62	四氟醚唑	109.32%	2.23%	101.22%	1.67%	89.14%	5.58%	103.86%	1.04%
63	丁草胺	107.29%	3.54%	103.24%	1.89%	79.65%	5.45%	102.90%	2.48%
64	丙硫磷	104.05%	1.60%	100.04%	2.49%	77.95%	3.75%	94.84%	2.15%
65	氟丁酰草胺	104.10%	2.24%	101.82%	1.94%	89.97%	6.59%	102.45%	3.37%
66	杀虫威	108.99%	2.52%	94.59%	5.41%	96.67%	2.42%	90.62%	3.73%
67	腐霉利	105.59%	3.17%	92.82%	0.77%	88.19%	5.76%	99.24%	1.17%
68	狄氏剂	106.23%	2.45%	98.00%	1.78%	81.65%	1.50%	99.99%	2.50%
69	杀扑磷	109.06%	2.39%	91.20%	5.40%	91.61%	2.32%	101.88%	1.59%
70	丙溴磷	106.08%	1.88%	94.97%	4.38%	89.93%	2.52%	98.89%	0.62%
71	敌草胺	106.54%	2.09%	99.99%	1.50%	84.77%	6.36%	100.09%	0.94%
72	己唑醇	105.19%	0.62%	90.43%	0.41%	81.18%	3.52%	100.05%	2.97%
73	抑草磷	112.81%	2.48%	109.19%	1.55%	90.78%	5.02%	114.03%	2.93%
74	多效唑	108.29%	2.85%	99.86%	2.50%	84.44%	6.50%	99.60%	3.08%
75	杀螨酯	106.64%	2.14%	98.50%	1.76%	85.18%	5.14%	101.36%	1.28%
76	吡氟禾草灵	104.80%	2.18%	101.53%	1.83%	89.40%	5.80%	100.63%	3.84%
77	稻瘟灵	104.43%	0.97%	102.17%	1.69%	88.01%	4.70%	100.81%	2.69%
78	硫环磷	110.49%	3.66%	92.81%	4.43%	91.75%	6.76%	104.92%	3.74%
79	乙酯杀螨醇	106.51%	2.01%	100.46%	2.25%	84.65%	4.92%	99.79%	0.62%
80	除草醚	113.23%	2.81%	106.08%	0.81%	83.20%	3.24%	115.93%	3.19%
81	乙硫磷	110.46%	2.16%	100.23%	2.53%	81.38%	3.60%	101.66%	2.37%
82	三氟硝草醚	124.82%	1.37%	109.14%	1.54%	92.67%	3.71%	94.28%	2.48%
83	氟虫腴	111.66%	1.58%	102.04%	1.41%	91.11%	5.40%	98.22%	3.08%

84	烯唑醇	106.93%	2.12%	98.57%	2.33%	79.91%	4.47%	98.83%	0.38%
85	腈菌唑	106.04%	1.91%	104.79%	2.44%	86.34%	4.34%	99.94%	1.78%
86	环唑醇-1	103.20%	1.67%	99.36%	5.20%	82.94%	2.63%	98.86%	2.71%
87	p,p'-DDT	92.04%	2.21%	118.61%	5.16%	82.31%	11.62%	70.30%	2.87%
88	环唑醇-2	105.21%	0.88%	106.10%	11.02%	81.38%	4.87%	99.85%	6.17%
89	甲氧滴滴涕	--- ²	--- ²	--- ²	--- ²	--- ²	--- ²	--- ²	--- ²
90	苯霜灵	105.54%	2.90%	101.16%	4.31%	86.25%	5.02%	98.80%	0.86%
91	丙环唑-1	108.69%	2.83%	98.36%	4.36%	87.34%	3.06%	102.75%	1.49%
92	禾草灵	106.01%	2.42%	101.65%	1.43%	87.94%	4.78%	99.80%	1.88%
93	丙环唑-2	114.08%	2.99%	97.93%	3.34%	85.03%	6.30%	98.22%	0.84%
94	倍硫磷亚砷	95.17%	6.46%	76.47%	8.79%	111.16%	19.57%	85.00%	6.54%
95	倍硫磷砷	105.98%	2.26%	80.80%	11.02%	100.82%	12.66%	98.88%	2.13%
96	咯菌腈	108.97%	3.98%	97.05%	1.60%	86.09%	2.93%	71.71%	8.38%
97	噁霜灵	107.12%	2.70%	101.12%	2.46%	90.82%	3.94%	100.58%	1.08%
98	异菌脲	122.58%	3.28%	102.14%	9.38%	68.78%	23.01%	95.41%	14.62%
99	乙螨唑	107.99%	1.52%	100.22%	2.34%	80.46%	2.34%	102.17%	1.95%
100	伐灭磷	107.00%	3.11%	83.28%	10.06%	100.86%	7.45%	99.15%	0.76%
101	甲氧菊酯	105.38%	2.84%	99.82%	2.11%	87.93%	3.30%	100.98%	3.14%
102	啞嗪硫磷	107.80%	2.77%	93.82%	3.47%	90.62%	2.61%	100.69%	0.97%
103	溴苯磷	104.02%	2.96%	90.60%	5.12%	82.50%	3.77%	95.66%	1.97%
104	亚胺硫磷	104.77%	2.96%	76.62%	11.66%	98.69%	9.00%	96.18%	1.83%
105	甲羧除草醚	120.09%	0.44%	110.02%	1.26%	85.70%	1.57%	99.92%	2.44%
106	氯氟氰菊酯-1	119.45%	7.08%	77.81%	9.86%	100.33%	4.07%	78.86%	2.57%
107	氟丙菊酯	102.89%	5.17%	104.45%	3.02%	93.94%	4.38%	103.74%	2.37%
108	氯氟氰菊酯-2	109.73%	4.82%	106.75%	4.58%	89.56%	1.97%	98.38%	4.14%
109	伏杀硫磷	107.54%	3.09%	90.50%	5.18%	93.75%	2.66%	101.78%	1.47%
110	苯噻酰草胺	108.45%	2.69%	101.64%	2.23%	82.50%	2.50%	102.68%	2.55%
111	益棉磷	111.22%	1.59%	88.90%	4.67%	80.13%	15.91%	102.69%	1.37%
112	氟啶唑	105.35%	2.08%	100.68%	1.83%	68.61%	26.67%	101.82%	1.88%
113	氟氯氰菊酯-1	109.95%	6.85%	103.20%	1.34%	92.94%	4.16%	100.19%	2.49%
114	氟氯氰菊酯-2	109.25%	2.69%	106.83%	3.76%	88.86%	1.05%	92.68%	5.93%
115	氟氯氰菊酯-3	114.18%	6.25%	97.21%	5.26%	84.69%	2.31%	97.22%	5.03%
116	蝇毒磷	106.65%	2.25%	87.18%	5.22%	92.28%	4.89%	101.58%	0.39%
117	氟氯氰菊酯-4	115.70%	5.43%	109.12%	4.39%	86.59%	3.89%	95.04%	1.02%
118	氟氰戊菊酯-1	113.49%	4.27%	109.16%	0.05%	90.59%	4.80%	93.39%	2.60%
119	氟氰戊菊酯-2	115.04%	2.99%	110.94%	2.75%	91.58%	5.55%	95.21%	1.10%
120	腈苯唑	107.30%	2.02%	98.42%	2.26%	83.10%	1.86%	102.83%	1.39%
121	氟胺氰菊酯-1	105.99%	3.63%	105.49%	1.44%	87.34%	3.94%	97.07%	2.23%
122	氟胺氰菊酯-2	105.99%	3.63%	105.88%	4.82%	91.08%	6.05%	97.07%	2.23%
123	苯醚甲环唑-1	106.23%	5.50%	100.85%	2.49%	85.99%	4.08%	108.71%	3.52%
124	苯醚甲环唑-2	113.12%	2.12%	100.59%	2.00%	75.63%	5.12%	100.48%	1.83%

注：---¹：阳性基质，空白基质中该农药含量高，无法计算回收率及 RSD

3. 结论

综上，本方案按照新国标方法，采用岛津的 SHIMSEN QuEChERS 产品对梨、韭菜、茶叶、大米等植物源性食品样品进行净化，同时采用岛津气相色谱串联质谱 GCMS-TQ8050，岛津 SH-1701 色谱柱进行分析，对普通水果、有色蔬菜、茶叶和谷物等 4 类植物源性食品中 208 种农药及其代谢物残留的检测方法进行了验证，结果表明，该方法操作简单、分析速度快、重现性好、准确度高，可以应对植物源性食品中多种农药残留同时测定的要求。

欲获得详细操作步骤和操作视频，请联系岛津公司购买如下耗材附件包

货号	描述
PRC KIT-001	植物源性食品中多农残测定 GC-MS/MS 法 耗材方法包

