EURL-PROFICIENCY TEST-FV-26

Pesticide Residues in Banana Homogenate

Final Report - September 2024

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CONTENTS

EURL-EUROPEAN UNION PROFICIENCY TEST 26
FOR THE DETERMINATION OF PESTICIDES IN FRUITS AND VEGETABLES USING MULTIRESIDUE METHODS
2024

According to Article 28 of Regulation 396/2005/EC (23rd February 2005) of the European Parliament and of the Council, concerning maximum residue levels for pesticides in or on food and feed of plant and animal origin[1], all laboratories analysing samples for the official control of pesticide residues shall participate in the European Union Proficiency Tests (EUPTs) for pesticide residues organised by the European Union. These proficiency tests are carried out on an annual basis in order to continuously improve the quality, accuracy and comparability of the residue data reported by EU Member States to the European Union, as well as by other Member States, within the framework of the EU multi-annual coordinated control programme and national monitoring programmes.

Regulation (EU) 2017/625[2] lays down the general tasks, duties and requirements for European Union Reference Laboratories (EURLs)[3] for Food, Feed and Animal Health. Among these tasks is the provision for independently organised comparative tests. European Proficiency Test FV-26 has been organised by the EURL in Fruits and Vegetables at the University of Almería, Spain[4].

Participation in European Proficiency Test FV-26 was mandatory for all National Reference Laboratories (NRLs), as well as all other EU official laboratories, involved in the determination of pesticide residues in fruits and vegetables for the EU multi-annual coordinated control programme or for their own national monitoring programmes. Additionally, laboratories from China, Costa Rica, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and United Kingdom participated in this test.

DG-SANTE will have full access to all data from the EUPTs including the lab-code/lab-name key. The NRLs will also have that information for the OfLs within their network. This report may be presented to the European Union Standing Committee on Plants, Animals, Food and Feed (PAFF).

[1] Regulation (EC) No 396/2005, published in the OJ of the EU L70 on 16.03.2005, last amended by Regulation 839/2008 published in the OJ of the EU L234 on 30.08.2008.
[2] Regulation (EU) 2017/625 of the European Parliament and of the Council on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. Published in the OJ of the EU L95 on 07.04.2017.
[3] The Community Reference Laboratory (CRL) changed its name to the European Union Reference Laboratory (EURL) on 1st December 2009 as a result of the Treaty of Lisbon. OJ of the EU C306 on 17.12.2007.
[4] Commission Regulation (EC) No 776/2006 of 23rd May 2006 - amending Annex VII to Regulation (EC) No 882/2004 of the European Parliament and of the Council as regards European Union Reference Laboratories.

1. INTRODUCTION

One hundred and seventy-five laboratories agreed to participate in EUPT-FV26.

The proficiency test was performed in 2024 using banana homogenate. Bananas were purchased at the local organic market in Almería, Spain, and were spiked with analytical standards. In EUPT-FV26, participating laboratories were not provided with a 'blank' sample.

The test item, 200 g of banana homogenate containing pesticide residues, was shipped to participants on 26th February 2024. The deadline for results submission to the Organiser was 1st March 2024. The participants were asked to determine the residue levels of all the pesticides that they detected and to report the concentrations in mg/kg. The participants were provided with two target pesticide lists, one with pesticides that had to be analysed on a compulsory basis, and a second one with pesticides to be analysed voluntarily. The compulsory list contained 213 target pesticides. The pesticide target list is detailed in Annex A together with the voluntary target list, which contained 52 pesticides. The lists of target pesticides also contained the MRRL for each pesticide fixed at 0.01 mg/kg, except for the following pesticides which have lower MRRLs based on Regulation (EU) No. 396/2005 and EU Directive 2006/125/EC, or for which EFSA requested lower LOQs: aldrin (0.005 mg/kg), azinphos-methyl (0.005 mg/kg), cadusafos (0.005 mg/kg), carbaryl (0.005 mg/kg), carbofuran (0.005 mg/kg), carbofuran-3-hydroxy (0.005 mg/kg), chlorpyrifos (0.005 mg/kg), chlorpyrifos methyl (0.005 mg/kg), demeton-S-methylsulfone (0.005 mg/kg), diazinon (0.005 mg/kg), dichlorvos (0.005 mg/kg), dieldrin (0.005 mg/kg), dimethoate (0.003 mg/kg), ethoprophos (0.005 mg/kg), fenbuconazole (0.005 mg/kg), fipronil (0.004 mg/kg), fipronil sulfone (0.004 mg/kg), imazalil (0.005 mg/kg), methidathion (0.005 mg/kg), monocrotophos (0.005 mg/kg), omethoate (0.003 mg/kg), oxydemeton-methyl (0.005 mg/kg), parathion-methyl (0.005 mg/kg), pirimiphos-methyl (0.005 mg/kg), terbuthylazine (0.005 mg/kg), tetraconazole (0.005 mg/kg) and triazophos (0.005 mg/kg).

Participants were asked to analyse and report results for any of the pesticides they found which were included in the target lists.

The robust mean values of the analytical data submitted by EU/EFTA participants were used to obtain the assigned (true) values for each of the pesticide residues present. A fit-for-purpose relative target standard deviation (FFP-RSD) of 25 % was chosen to calculate the target standard deviations (σ) as well as the z scores for the individual pesticides.

For the assessment of overall laboratory performance, the Average of the squared z scores (AZ^2) was used. Laboratories that had 'sufficient scope' and were able to analyse at least 90 % of the compulsory pesticides in the target pesticides list, had correctly detected and quantified a sufficiently high percentage of the pesticides present in the Test Item (at least 90 %) and reported no false positives, were classified into Category A. Within this category, the laboratories were also subclassified as 'good', 'satisfactory' or 'unsatisfactory', in relation to the overall accuracy of the results that they reported.

All the other laboratories were classified into Category B. For laboratories in Category B, individual z scores were calculated but the overall accuracy of their results was not assessed.

Laboratories that did not report results have not been classified into any category.

2. TEST ITEMS

2.1 Preparation of the treated test item

Bananas were purchased at the local organic market in Almería, Spain, and they were spiked using analytical standards of ametoctradin, azoxystrobin, bifenthrin, chlorpyrifos, cypermethrin (sum), diazinon, fenpicoxamid, flupyradifurone, fuquinconazole, fluxapyroxad, metconazole, monocrotophos, myclobutanil, omethoate, pyrimethanil, spiroxamine and thiabendazole.

Before preparation of the test item, the pesticides and target residue levels were selected, following recommendations made by the QCG, which had been appointed specifically for EUPT-FV-26. Approximately 100 kg of bananas were ground and homogenised in a large stainless steel container. Before grinding, ascorbic acid was added to the bananas to prevent oxidation (1 % ascorbic acid). Subsequently, they were spiked with the analytical standards dissolved in acetonitrile. Once homogenized, the material was packed in zip bags and frozen at -18° C. Nine days later, the resulting ice blocks were crushed with ice crushers, and 200 g portions of the material were weighed out into screw-capped polyethylene plastic bottles, sealed and stored in a freezer at about - 20 °C prior to distribution to participants.

2.2 Homogeneity test

The homogeneity and stability tests were performed by the EURL-FV laboratory at the University of Almería (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC). Ten bottles of the treated test item were randomly chosen from those stored in the freezer and analyses were performed on duplicate portions taken from each bottle. The injection sequence of the 20 extracts that were analysed by GC and LC was also randomly chosen.

The statistical evaluation was performed according to the International Harmonized Protocol published by IUPAC, ISO and AOAC [1]. The individual residues data from the homogeneity tests are given in **Appendix 1**. The results of the statistical analyses (for the evaluated compounds) are given in **Table 1**. The acceptance criteria for the test item to be sufficiently homogenous for the proficiency test were that: $Ss^2 < c$, where Ss is the between-bottle sampling standard deviation and $c = F_1\sigma^2_{all} + F_2S^2_{an}$; F_1 and F_2 being constant values of 1.88 and 1.01, respectively, from the ten samples taken, and σ^2_{all} = (0.3 x FFP-RSD(25 %) x mean concentration)^2. This was used to demonstrate that the between-bottle variance was not higher than the within-bottle variance.

Table 1. Statistical evaluation of the homogeneity test data (n = 20 analyses)

Pesticide	Mean Conc. (mg/kg)	Ss^2	c	$Ss^2 < c$ Pass/Fail
Ametoctradin	0.081	0.00E+00	1.30E-04	Pass
Azoxystrobin	0.550	4.80E-04	3.60E-03	Pass
Bifenthrin	0.146	1.88E-04	2.80E-04	Pass
Chlorpyrifos	0.047	1.16E-05	3.00E-05	Pass
Cypermethrin	0.136	1.08E-04	2.50E-04	Pass
Diazinon	0.091	4.64E-06	1.20E-04	Pass
Flupyradifurone	0.159	5.25E-06	2.80E-04	Pass
Fluquinconazole	0.071	7.93E-06	6.00E-05	Pass
Fluxapyroxad	0.546	3.29E-04	3.57E-03	Pass
Monocrotophos	0.053	2.07E-06	3.00E-05	Pass
Myclobutanil	0.089	2.32E-06	1.10E-04	Pass
Omethoate	0.087	2.99E-06	9.00E-05	Pass
Pyrimethanil	0.097	2.43E-06	1,10E-04	Pass
Spiroxamine	0.227	1.01E-05	5.70E-04	Pass
Thiabendazol	0.848	7.36E-04	7.70E-03	Pass
Voluntary Pesticides				
Fenpicoxamid	0.066	6.12E-06	6.00E-05	Pass
Metconazole	0.092	0.00E+00	1.30E-04	Pass

S_s: Between-Sampling Standard Deviation

As can be seen from **Table 1**, all the pesticides evaluated in the melon test item passed the homogeneity test.

2.3 Stability tests

Stability tests were also carried out by the EURL-FV laboratory at the University of Almería (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC). The tests were performed according to ISO 13528:2015, Annex B [2]. Shortly before the test item shipment, three bottles that were stored in the freezer at -20 °C were chosen randomly and stored in a -80 °C freezer (Day 1). After the deadline for reporting results, those three bottles stored at -80 °C, together with three other bottles that were stored in the freezer at -20 °C and were chosen randomly (Day 2) were analysed by duplicate.

A pesticide was considered to be adequately stable if $|x_1 - y_i| \leq 0.3 \times \sigma$, where x_1 is the mean value of the Day 1 stability test, y_i the mean value of the Day 2 stability test and σ the standard deviation used for proficiency assessment (typically 25 % of the assigned value).

The individual results for the evaluated compounds are given in **Table 2**. This test did not show any significant decrease in the pesticide concentrations with time. This demonstrates that, for the duration of the proficiency test, and provided that the storage conditions prescribed were followed, the time elapsed until the participants performed the analysis would not have influenced their results.

Table 2. Statistical test for analytical precision and to demonstrate results stability after the interval of time-elapse between the shipment of the test item and the deadline for reporting of results.

(mg/kg)	Day 1							Day 2							(M2 – M1)	M2-M1 ≤ 0.3*σ
	Sample 82_A	Sample 82_B	Sample 222_A	Sample 222_B	Sample 45_A	Sample 45_B	Mean 1	Sample 181_A	Sample 181_B	Sample 178_A	Sample 178_B	Sample 18_A	Sample 18_B	Mean 2		
Ametoctradin	0.072	0.067	0.066	0.069	0.078	0.069	0.070	0.066	0.075	0.068	0.071	0.073	0.099	0.075	0.005	Pass
Azoxystrobin	0.505	0.541	0.522	0.560	0.524	0.559	0.535	0.526	0.494	0.500	0.503	0.558	0.492	0.512	-0.023	Pass
Bifenthrin	0.168	0.184	0.165	0.181	0.178	0.186	0.177	0.181	0.193	0.177	0.193	0.191	0.187	0.187	0.010	Pass
Chlorpyrifos	0.053	0.060	0.054	0.057	0.055	0.057	0.056	0.058	0.061	0.057	0.064	0.058	0.059	0.060	0.004	Pass
Cypermethrin	0.156	0.171	0.155	0.175	0.164	0.177	0.166	0.171	0.184	0.167	0.185	0.178	0.178	0.177	0.011	Pass
Diazinon	0.089	0.092	0.093	0.093	0.086	0.090	0.091	0.080	0.083	0.100	0.087	0.081	0.085	0.086	-0.005	Pass
Flupyradifurone	0.159	0.161	0.154	0.154	0.157	0.156	0.157	0.158	0.155	0.159	0.154	0.162	0.151	0.156	0.000	Pass
Fluquinconazole	0.074	0.068	0.069	0.072	0.066	0.071	0.070	0.074	0.076	0.075	0.074	0.069	0.071	0.074	0.003	Pass
Fluxapyroxad	0.496	0.582	0.542	0.538	0.507	0.589	0.542	0.520	0.575	0.506	0.493	0.513	0.527	0.522	-0.020	Pass
Monocrotophos	0.054	0.056	0.053	0.053	0.055	0.053	0.054	0.054	0.053	0.054	0.054	0.054	0.053	0.054	0.000	Pass
Myclobutanil	0.092	0.091	0.086	0.090	0.089	0.085	0.089	0.088	0.090	0.091	0.093	0.093	0.089	0.090	0.002	Pass
Omethoate	0.087	0.088	0.083	0.087	0.087	0.087	0.086	0.086	0.088	0.087	0.085	0.087	0.085	0.086	0.000	Pass
Pyrimethanil	0.105	0.112	0.097	0.105	0.104	0.099	0.103	0.106	0.108	0.104	0.100	0.103	0.101	0.104	0.000	Pass
Spiroxamine	0.231	0.247	0.238	0.227	0.230	0.228	0.233	0.239	0.238	0.230	0.235	0.238	0.225	0.234	0.001	Pass
Thiabendazol	0.762	0.824	0.752	0.804	0.750	0.795	0.781	0.786	0.818	0.741	0.788	0.750	0.783	0.778	-0.004	Pass
Voluntary Pesticides																
Fenpicoxamid	0.070	0.074	0.082	0.083	0.080	0.085	0.079	0.088	0.080	0.081	0.082	0.083	0.088	0.084	0.005	Pass
Metconazole	0.094	0.101	0.090	0.097	0.092	0.093	0.094	0.099	0.103	0.097	0.085	0.098	0.094	0.096	0.001	Pass

Moreover, regarding the stability of the sample arriving not completely frozen, a duplicate analysis of three bottles reproducing the delivery conditions that the samples experienced for 48 hours was performed (Day 3). Laboratories could therefore be sufficiently confident in accepting the treated test item even if it was not completely frozen. All the pesticides passed this second stability test. Results for this 48-hour stability test are indicated in **Table 3**.

As one of the parcels sent to an EU Member State arrived after 96 hours of the shipment, two additional stability tests reproducing the delivery conditions that the samples experienced for 72 and 96 hours were performed (Day 4 and Day 5). All the pesticides passed these third and fourth stability tests. Results for those 72 and 96 hour stability tests are indicated in **Table 4 and Table 5**, respectively.

Table 3. Statistical test for analytical precision and to demonstrate stability for the 48-hour time-elapse interval.

(mg/kg)	Day 1							Day 3							(M2 – M1)	M3-M1 ≤ 0.3*σ
	Sample 82_A	Sample 82_B	Sample 222_A	Sample 222_B	Sample 45_A	Sample 45_B	Mean 1	Sample 131_A	Sample 131_B	Sample 70_A	Sample 70_B	Sample 230_A	Sample 230_B	Mean 2		
Ametoctradin	0.072	0.067	0.066	0.069	0.078	0.069	0.070	0.075	0.073	0.065	0.065	0.068	0.068	0.069	-0.001	Pass
Azoxystrobin	0.505	0.541	0.522	0.560	0.524	0.559	0.535	0.510	0.504	0.533	0.490	0.518	0.554	0.518	-0.017	Pass
Bifenthrin	0.168	0.184	0.165	0.181	0.178	0.186	0.177	0.183	0.182	0.175	0.180	0.184	0.190	0.182	0.005	Pass
Chlorpyrifos	0.053	0.060	0.054	0.057	0.055	0.057	0.056	0.057	0.056	0.055	0.056	0.059	0.060	0.057	0.001	Pass
Cypermethrin	0.156	0.171	0.155	0.175	0.164	0.177	0.166	0.175	0.172	0.164	0.172	0.175	0.177	0.172	0.006	Pass
Diazinon	0.089	0.092	0.093	0.093	0.086	0.090	0.091	0.085	0.090	0.086	0.085	0.097	0.081	0.087	-0.003	Pass
Flupyradifurone	0.159	0.161	0.154	0.154	0.157	0.156	0.157	0.154	0.159	0.152	0.146	0.158	0.152	0.154	-0.003	Pass
Fluquinconazole	0.074	0.068	0.069	0.072	0.066	0.071	0.070	0.076	0.076	0.064	0.076	0.068	0.069	0.072	0.001	Pass
Fluxapyroxad	0.496	0.582	0.542	0.538	0.507	0.589	0.542	0.529	0.520	0.496	0.520	0.526	0.567	0.526	-0.016	Pass
Monocrotophos	0.054	0.056	0.053	0.053	0.055	0.053	0.054	0.054	0.057	0.054	0.051	0.054	0.054	0.054	0.000	Pass
Myclobutanil	0.092	0.091	0.086	0.090	0.089	0.085	0.089	0.089	0.089	0.086	0.086	0.088	0.086	0.087	-0.002	Pass
Omethoate	0.087	0.088	0.083	0.087	0.087	0.087	0.086	0.086	0.092	0.083	0.080	0.085	0.084	0.085	-0.001	Pass
Pyrimethanil	0.105	0.112	0.097	0.105	0.104	0.099	0.103	0.098	0.103	0.102	0.100	0.099	0.103	0.101	-0.003	Pass
Spiroxamine	0.231	0.247	0.238	0.227	0.230	0.228	0.233	0.239	0.233	0.228	0.221	0.240	0.223	0.231	-0.003	Pass
Thiabendazol	0.762	0.824	0.752	0.804	0.750	0.795	0.781	0.762	0.807	0.781	0.790	0.760	0.802	0.784	0.002	Pass
Voluntary Pesticides																
Fenpicoxamid	0.070	0.074	0.082	0.083	0.080	0.085	0.079	0.077	0.079	0.080	0.082	0.090	0.084	0.082	0.003	Pass
Metconazole	0.094	0.101	0.090	0.097	0.092	0.093	0.094	0.093	0.094	0.086	0.089	0.100	0.101	0.094	-0.001	Pass

Table 4. Statistical test for analytical precision and to demonstrate stability for the 72-hour time-elapse interval.

(mg/kg)	Day 1							Day 4							(M2 – M1)	M4-M1 ≤ 0.3*σ
	Sample 170_A	Sample 170_B	Sample 55_A	Sample 55_B	Sample 54_A	Sample 54_B	Mean 1	Sample 145_A	Sample 145_B	Sample 80_A	Sample 80_B	Sample 240_A	Sample 240_B	Mean 2		
Ametoctradin	0.072	0.067	0.066	0.069	0.078	0.069	0.070	0.076	0.064	0.072	0.070	0.082	0.074	0.073	0.003	Pass
Azoxystrobin	0.505	0.541	0.522	0.560	0.524	0.559	0.535	0.537	0.526	0.551	0.570	0.531	0.546	0.543	0.008	Pass
Bifenthrin	0.168	0.184	0.165	0.181	0.178	0.186	0.177	0.187	0.183	0.119	0.189	0.199	0.181	0.176	-0.001	Pass
Chlorpyrifos	0.053	0.060	0.054	0.057	0.055	0.057	0.056	0.059	0.058	0.038	0.058	0.061	0.055	0.055	-0.001	Pass
Cypermethrin	0.156	0.171	0.155	0.175	0.164	0.177	0.166	0.172	0.175	0.107	0.176	0.183	0.173	0.164	-0.002	Pass
Diazinon	0.089	0.092	0.093	0.093	0.086	0.090	0.091	0.079	0.089	0.096	0.093	0.096	0.093	0.091	0.000	Pass
Flupyradifurone	0.159	0.161	0.154	0.154	0.157	0.156	0.157	0.154	0.154	0.152	0.161	0.172	0.148	0.157	0.000	Pass
Fluquinconazole	0.074	0.068	0.069	0.072	0.066	0.071	0.070	0.073	0.066	0.076	0.071	0.078	0.071	0.072	0.002	Pass
Fluxapyroxad	0.496	0.582	0.542	0.538	0.507	0.589	0.542	0.501	0.471	0.558	0.620	0.535	0.584	0.545	0.002	Pass
Monocrotophos	0.054	0.056	0.053	0.053	0.055	0.053	0.054	0.052	0.055	0.055	0.055	0.060	0.054	0.055	0.001	Pass
Myclobutanil	0.092	0.091	0.086	0.090	0.089	0.085	0.089	0.081	0.086	0.087	0.087	0.103	0.085	0.088	-0.001	Pass
Omethoate	0.087	0.088	0.083	0.087	0.087	0.087	0.086	0.081	0.085	0.085	0.089	0.094	0.084	0.086	0.000	Pass
Pyrimethanil	0.105	0.112	0.097	0.105	0.104	0.099	0.103	0.097	0.104	0.100	0.106	0.110	0.096	0.102	-0.001	Pass
Spiroxamine	0.231	0.247	0.238	0.227	0.230	0.228	0.233	0.234	0.218	0.237	0.232	0.234	0.223	0.230	-0.004	Pass
Thiabendazol	0.762	0.824	0.752	0.804	0.750	0.795	0.781	0.752	0.774	0.842	0.851	0.779	0.813	0.802	0.021	Pass
Voluntary Pesticides																
Fenpicoxamid	0.070	0.074	0.082	0.083	0.080	0.085	0.079	0.067	0.069	0.072	0.081	0.090	0.078	0.076	-0.003	Pass
Metconazole	0.094	0.101	0.090	0.097	0.092	0.093	0.094	0.089	0.095	0.098	0.107	0.107	0.084	0.097	0.002	Pass

Table 5. Statistical test for analytical precision and to demonstrate stability for the 96-hour time-elapse interval.

(mg/kg)	Day 1							Day 4								
	Sample 170_A	Sample 170_B	Sample 55_A	Sample 55_B	Sample 54_A	Sample 54_B	Mean 1	Sample 148_A	Sample 148_B	Sample 27_A	Sample 27_B	Sample 232_A	Sample 232_B	Mean 2	(M2 – M1)	M4-M1 ≤ 0,3*σ
Ametoctradin	0.072	0.067	0.066	0.069	0.078	0.069	0.070	0.074	0.075	0.071	0.064	0.070	0.069	0.070	0.000	Pass
Azoxystrobin	0.505	0.541	0.522	0.560	0.524	0.559	0.535	0.501	0.528	0.551	0.511	0.508	0.573	0.529	-0.006	Pass
Bifenthrin	0.168	0.184	0.165	0.181	0.178	0.186	0.177	0.175	0.186	0.189	0.186	0.181	0.163	0.180	0.003	Pass
Chlorpyrifos	0.053	0.060	0.054	0.057	0.055	0.057	0.056	0.058	0.058	0.059	0.057	0.055	0.049	0.056	0.000	Pass
Cypermethrin	0.156	0.171	0.155	0.175	0.164	0.177	0.166	0.165	0.176	0.175	0.170	0.165	0.153	0.167	0.001	Pass
Diazinon	0.089	0.092	0.093	0.093	0.086	0.090	0.091	0.093	0.087	0.091	0.081	0.075	0.083	0.085	-0.006	Pass
Flupyradifurone	0.159	0.161	0.154	0.154	0.157	0.156	0.157	0.154	0.153	0.154	0.152	0.159	0.144	0.153	-0.004	Pass
Fluquinconazole	0.074	0.068	0.069	0.072	0.066	0.071	0.070	0.070	0.070	0.078	0.068	0.072	0.080	0.073	0.003	Pass
Fluxapyroxad	0.496	0.582	0.542	0.538	0.507	0.589	0.542	0.460	0.506	0.544	0.532	0.558	0.546	0.525	-0.018	Pass
Monocrotophos	0.054	0.056	0.053	0.053	0.055	0.053	0.054	0.053	0.053	0.055	0.052	0.056	0.050	0.053	-0.001	Pass
Myclobutanil	0.092	0.091	0.086	0.090	0.089	0.085	0.089	0.088	0.080	0.094	0.083	0.087	0.090	0.087	-0.002	Pass
Omethoate	0.087	0.088	0.083	0.087	0.087	0.087	0.086	0.084	0.088	0.087	0.087	0.091	0.083	0.087	0.000	Pass
Pyrimethanil	0.105	0.112	0.097	0.105	0.104	0.099	0.103	0.099	0.100	0.103	0.097	0.098	0.095	0.099	-0.005	Pass
Spiroxamine	0.231	0.247	0.238	0.227	0.230	0.228	0.233	0.230	0.231	0.231	0.224	0.230	0.214	0.227	-0.007	Pass
Thiabendazol	0.762	0.824	0.752	0.804	0.750	0.795	0.781	0.772	0.778	0.798	0.797	0.791	0.815	0.792	0.011	Pass
Voluntary Pesticides																
Fenpicoxamid	0.070	0.074	0.082	0.083	0.080	0.085	0.079	0.076	0.072	0.079	0.087	0.077	0.084	0.079	0.000	Pass
Metconazole	0.094	0.101	0.090	0.097	0.092	0.093	0.094	0.099	0.083	0.089	0.094	0.094	0.088	0.091	-0.003	Pass

2.4 Distribution of test items and protocol to participants

One bottle of frozen treated test item was shipped to each participant in boxes containing dry ice. The test items were sent out on 26th February 2024. All the shipments to EU/EFTA countries arrived within the first 96 hours.

Before sample shipment, the laboratories received full instructions (Annex A) for the receipt and storage of the test item, and they were encouraged to use their normal sample receipt procedure and method(s) of analysis. These instructions were uploaded onto the open site of the EURL-FV webpage as part of the Specific Protocol. The Application Form was also available as an on-line form. After applying for the test, each participant laboratory received their Lab Code and password, thus allowing them to participate. This ensured that confidentiality was maintained throughout the duration of Proficiency Test 26. The Target Pesticide List and the Minimum Required Reporting Levels (MRRLs), as established by the Advisory Group, were uploaded onto the EURL-FV open website at least three months before the shipment of the test item to allow laboratories enough time to purchase standards and to validate their methods.

3. STATISTICAL METHODS

3.1 False positives and negatives

3.1.1 False positives

These are results of pesticides from the Target Pesticides List. that are reported at, or above, their respective MRRLs although they were: (i) not detected by the Organiser, even after repeated

analyses, and/or (ii) not detected by the overwhelming majority (e.g. > 95 %) of the participating laboratories that had targeted the specific pesticides. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary.

Any results reported lower than the MRRL will not be considered as false positives, even though these results should not have been reported.

No z score values have been calculated for false positive results. Any laboratory reporting a false positive, even when reporting the necessary number of pesticides to obtain sufficient scope, has been classified into Category B.

3.1.2 False negatives

These are results for pesticides reported by the laboratories as 'analysed' but without reporting numerical values although they were: a) used by the Organiser to treat the Test Item and b) detected by the Organiser as well as the majority of the participants that had targeted these specific pesticides at or above the respective MRRLs. Results reported as '< RL' (RL= Reporting Limit of the laboratory) will be considered as not detected and will be judged as false negatives. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary.

In cases of the assigned value being less than a factor of 3 times the MRRL, false negatives will typically not be assigned. The EUPT-Panel may decide to take case-by-case decisions in this respect after considering all relevant factors such as the result distribution and the reporting limits of the affected labs.

All false negatives have been assigned a z score of -4.0. However, these z scores have not been taken into account in assessing the 90 %. or more, of pesticides present in the sample needed to be classified into Category A.

3.2 Estimation of the assigned values (x_{pt})

In order to minimise the influence of out-lying results on the statistical evaluation, the assigned value (= consensus concentration) was estimated using robust statistics as described in ISO 13528:2015, considering the results reported by EU and EFTA countries laboratories only. Individual results without any numerical values reported, such as detected (D), were not considered. The spread of results for each pesticide was tested for multimodality. Results that were ≥ 10 times above or below the assigned value were excluded for the calculation of the assigned value. In special justifiable cases, the EUPT-Panel may decide to eliminate certain results traceably associated with gross errors or to use only the results of a subgroup consisting of laboratories that have repeatedly demonstrated good performance for the specific compound in the past.

Considering the normative for robust analysis in ISO 13528:2015, the uncertainty accompanying the assigned value for each pesticide was calculated according to the following equation:

$$u(x_{pt}) = 1.25\frac{s^*}{\sqrt{p}}$$

Where:

- $u(x_{pt})$ is the uncertainty in mg/kg.
- s^* is the robust standard deviation of the results.
- p is the total number of results.

3.3 Fixed target standard deviations

Based on the experience gained from previous EU proficiency tests and recommendations from the EURL Advisory Group. a fixed relative standard deviation (FFP-RSD) of 25 % was chosen [3]. This is in line with the internationally accepted target Measurement Uncertainty of 50 % for multiresidue analysis of pesticides [4], which is derived from, and linked to the EUPTs. The same target RSD has been applied to all the pesticides, independent of concentration. For informative purposes the robust relative standard deviation (CVs*) is calculated according to ISO 13528:2015 Chapter 7.7 (Consensus value from participant results) following Algorithm A in Annex C, and it can be compared to the FFP-RSD in **Table 7**.

3.4 z scores

A z score for each laboratory/pesticide combination was calculated according to the following equation:

$$z_i = \frac{(x_i - x_{pt})}{\sigma_{\mathrm{pt}}}$$

Where:

- x_i is the result reported by the participant.
- X_{pt} is the assigned value.
- σ_{pt} is the target standard deviation (the FFP-RSD of 25 % multiplied by the assigned value).

z score classification is as follows:

$\lvert z \rvert \leq 2.0$	Acceptable
$2.0 < \lvert z \rvert < 3.0$	Questionable
$\lvert z \rvert \geq 3.0$	Unacceptable

- Any z score value of $\lvert z \rvert > 5$ has been reported as '>5' and a value of '5' has been used to calculate combined z scores.
- No z score calculations have been performed for false positive results.
- For false negative results. a z score of -4.0 will be assigned. These z scores have also been included in the graphical representation and are marked with an asterisk.

3.5 Combined z scores

In order to evaluate each laboratory's overall performance according to the quality of its results and its scope, two classifications - Category A and B - were used. To be classified into Category A, laboratories had to be able to analyse at least 90 % of the compulsory pesticides in the target pesticides list, to correctly identify and report quantitative results (that is *sought and detected*) for 90 % or more of the total number of pesticides evaluated in the test item and report no false positives (for the 90 % criterion the number of pesticides needed to be correctly analysed to have sufficient scope will be calculated by multiplying the number of compulsory pesticides from the

Target Pesticides List by 0.9 and rounded to the nearest full number with 0.5 decimals being rounded downwards). If these three requirements were met, then the combined z scores were calculated as the 'Average of the Squared z scores' (AZ^2) [5].

3.5.1 The Average of the Squared z scores (AZ^2)

The 'Average of the Squared z scores' was introduced for the first time in EUPT-FV12. The AZ^2 is calculated as follows:

$$AZ^2 = \frac{\sum_{i=1}^{n} Z_i^2}{n}$$

The resultant formula is the sum of the z scores value, multiplied by itself and divided by the number of z scores (n) detected by each laboratory, including those from false negatives.

This formula is subsequently used to produce an overall classification of laboratories with three sub-classifications: 'good', 'satisfactory' and 'unsatisfactory'.

$\lvert AZ^2 \rvert \leq 2.0$	Good
$2.0 < \lvert AZ^2 \rvert < 3.0$	Satisfactory
$\lvert AZ^2 \rvert \geq 3.0$	Unsatisfactory

In this way, a simple, single, combined value is also achieved, as with the previous formula. However, this time, it is more mathematically justifiable as it uses the actual z score value rather than the factors 1, 3 and 5. Again, the aim is to encourage laboratories to not only improve the accuracy of their results but also to analyse a greater number of pesticides.

Laboratories that did not detect and quantify sufficient pesticides, that were not able to analyse at least 90 % of the compulsory pesticides or reported a false positive, have been placed in Category B and no combined z score has been calculated.
In **Appendices 5 and 6,** only results of laboratories in Category A have been presented, along with their graphical representations.

4. RESULTS

4.1 Summary of reported results

All results reported by the participants are given in **Appendix 3,** whilst the analytical methods used are given in **Appendix 7** (available in the EURL-FV web page in electronic format).

One hundred and seventy-five laboratories agreed to participate in this proficiency test. All of them reported results, which are presented in this report. However, only results reported by laboratories from EU-countries and EFTA-countries (Iceland, Norway and Switzerland), have been included in the statistical treatment. The results from the laboratories in China, Costa Rica, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and United Kingdom have not been included. This last group totals 15 laboratories that reported results.

Fifteen pesticides from the compulsory pesticide target list and two voluntary compounds were used to treat the sample and were present in the test item at concentrations above the MRRL.

A summary of the reported results for the pesticides included in the test item can be seen below in **Table 6**.

Table 6. Summary of Reported Results

Pesticides	No. of Reported Results	No. of False Negative Results	No. of Not Analysed Results	Percentage of Reported Results[a] (out of 160)
Ametoctradin	139	2	19	87
Azoxystrobin	159	0	1	99
Bifenthrin	153	2	5	96
Chlorpyrifos	157	0	3	98
Cypermethrin (sum)	153	2	5	96
Diazinon	156	2	2	98
Flupyradifurone	98	5	57	61
Fluquinconazole	153	1	6	96
Fluxapyroxad	139	3	18	87
Monocrotophos	152	2	6	95
Myclobutanil	156	0	4	98
Omethoate	153	2	5	96
Pyrimethanil	154	2	4	96
Spiroxamine	153	0	7	96
Thiabendazole	151	2	7	94
Voluntary Pesticides				
Fenpicoxamid	61	3	96	38
Metconazole	123	1	36	77

[a] The percentage of Reported Results comes from 160 laboratories. It does not take into account the fifteen laboratories from China. Costa Rica. Kenya. Peru. Serbia. Singapore. Thailand. Turkey and United Kingdom that submitted results.

4.1.1 False positives

Seven laboratories reported results for six additional pesticides that were not present in the test item. These pesticides and the residue levels reported are presented in **Table 7**, together with the MRRLs and reporting limits (RLs). Where the reported concentrations of the erroneously detected pesticide were higher than the assigned MRRL value in the Target Pesticide List (Annex A), the result has been considered as a false positive. If the concentrations reported were below the MRRLs, or if the pesticides did not appear in the pesticide list included in Annex A, then they were not considered to be false positives.

Table 7. Laboratories that reported as quantitative results for pesticides that were not present in the treated test item

Laboratory Code	Pesticide	Concentration (mg/kg)	Determination Technique	RL (mg/kg)	MRRL (mg/kg)
20	Fenpropathrin	0.035	GC-MS/MS (QQQ)	0.01	0.01
29	Epoxiconazole	0.0666	LC-MS/MS QQQ	0.01	0.01
29	Thiamethoxam	0.6398	LC-MS/MS QQQ	0.01	0.01
29	Trichlorfon	0.0703	LC-MS/MS QQQ	0.01	0.01
40	Trichlorfon	0.0183	LC-MS/MS QQQ	0.02	0.01
58	Trichlorfon	0.058	LC-MS/MS QQQ	0.01	0.01
80	Cyfluthrin (sum)	0.032	GC-MS/MS (QQQ)	0.01	0.01

Laboratory Code	Pesticide	Concentration (mg/kg)	Determination Technique	RL (mg/kg)	MRRL (mg/kg)
111	Fenpropathrin	0.05	LC - MS/MS	0.01	0.01
138	Mandipropamid	0.025	LC-MS/MS QQQ	0.01	0.01

4.1.2 False negatives

Tables 8a and b summarise the results from laboratories (including non-EU laboratories, indicated with §) that reported false negatives, presented as 'Not Detected' (ND).

Table 8.a Laboratories that failed to report mandatory pesticides that were present in the treated test item.

LabCode	Ametoctradin	Bifenthrin	Chlorpyrifos	Cypermethrin (sum)	Diazinon	Flupyradifurone	Fluquinconazole	Fluxapyroxad	Monocrotophos	Omethoate	Pyrimethanil	Spiroxamine	Thiabendazole
7	ND												
17							ND						
65§			ND	ND								ND	
92				ND									
108									ND	ND	ND		
113								ND					
119						ND							
123						ND							
138						ND							
139		ND											
140						ND							
149					ND			ND					
152					ND				ND				
158													ND
161										ND			
166				ND									ND
172		ND											
186											ND		
187	ND					ND		ND					

§ Non-EU/EFTA laboratories ND: Not detected

Table 8.b Laboratories that failed to report voluntary pesticides that were present in the treated test item.

LabCode	Fenpicoxamid	Metconazole
53§	ND	
68	ND	
74	ND	
80		ND
131	ND	

§ Non-EU/EFTA laboratories ND: Not detected

4.1.3 Distribution of data

The distribution of the concentrations of the pesticides reported by the laboratories has been plotted as histograms with a bandwidth of 0.75 · σ (σ is the target standard deviation (the FFP-RSD of 25 % multiplied by the assigned value). The histograms of both the compulsory and voluntary pesticides present in the test item are presented in **Appendix 2**.

4.2 Assigned values and target standard deviations

The assigned values are based on the robust mean values calculated using all the results reported by laboratories from EU and EFTA countries, after exclusion of gross errors (those results ≥ 10 times above or below the assigned value). In total, four outliers were removed for the calculation of the robust mean, one for bifenthrin, another one for cypermethrin and two for omethoate.

The assigned values for the fifteen compulsory and two voluntary pesticides and their uncertainties are presented in **Table 9**.

The target standard deviation was calculated using a fixed FFP-RSD value of 25 %. For comparison, a robust standard deviation (CV*) was also calculated for informative purposes, also employing this value for the calculation of the uncertainty. These RSDs can be seen in **Table 9**.

Table 9. Robust mean values, uncertainty and % RSDs for all pesticides evaluated.

Pesticides	MRRL (mg/kg)	Robust mean (mg/kg)	Uncertainty (mg/kg)	Number of results (n)	FFP-RSD (%)	CV* (%)
Ametoctradin	0.01	0.0783	0.0015	139	25	17.6
Azoxystrobin	0.01	0.461	0.0063	159	25	13.7
Bifenthrin	0.01	0.166	0.0030	153	25	17.9
Chlorpyrifos	0.005	0.0524	0.0008	157	25	15.8
Cypermethrin (sum)	0.01	0.157	0.0035	153	25	22.1
Diazinon	0.005	0.0793	0.0014	156	25	17.4
Flupyradifurone	0.01	0.166	0.0025	98	25	11.9
Fluquinconazole	0.01	0.0643	0.0010	153	25	15.8
Fluxapyroxad	0.01	0.478	0.0063	139	25	12.4
Monocrotophos	0.005	0.0594	0.0009	152	25	14.1
Myclobutanil	0.01	0.0879	0.0011	156	25	12.5
Omethoate	0.003	0.0957	0.0017	153	25	17.5
Pyrimethanil	0.01	0.0979	0.0012	154	25	12.3
Spiroxamine	0.01	0.224	0.0031	153	25	13.9
Thiabendazole	0.01	0.890	0.0169	151	25	18.7
Voluntary Pesticides						
Fenpicoxamid	0.01	0.0641	0.0022	61	25	21.9
Metconazole	0.01	0.0899	0.0014	123	25	13.3

4.3 Assessment of laboratory performance

4.3.1 z scores

z scores were calculated using the FFP-RSD of 25 % for all the pesticides evaluated.

In **Appendix 3** the individual z scores are presented for each laboratory, together with the concentrations reported for each pesticide. The z scores of laboratories from non-EU countries have

been included in **Appendix 3**, but have not been considered in **Table 10**, where the classification of z scores reported by EU/EFTA laboratories is shown.

Table 10. Classification of z scores for the pesticides reported (only EU/EFTA participants)

Pesticides	Acceptable (%)	Questionable (%)	Unacceptable (%)
Ametoctradin	91.5	2.8	5.7
Azoxystrobin	98.1	1.3	0.6
Bifenthrin	94.2	2.6	3.2
Chlorpyrifos	96.8	1.9	1.3
Cypermethrin (sum)	92.9	1.9	5.2
Diazinon	94.9	2.5	2.5
Flupyradifurone	94.2	1.0	4.9
Fluquinconazole	98.1	0.6	1.3
Fluxapyroxad	94.4	2.1	3.5
Monocrotophos	92.9	2.6	4.5
Myclobutanil	98.1	0.6	1.3
Omethoate	92.3	2.6	5.2
Pyrimethanil	96.8	1.3	1.9
Spiroxamine	95.4	3.9	0.7
Thiabendazole	93.5	3.3	3.3
Voluntary Pesticides			
Fenpicoxamid	90.6	1.6	7.8
Metconazole	98.4	0.0	1.6

z scores for false negative results have been assigned the fixed value of -4.0.

In **Appendix 4**, graphical representations of the z scores of EU/EFTA laboratories are presented. No z scores have been calculated for false positive results; z scores for false negative results have been included on the chart and are indicated by an asterisk.

4.3.2 Combined z scores

As previously mentioned in Section 3.5., the AZ^2 formula has only been applied to those participants categorised into Category A and considering only compulsory pesticides.

The table in **Appendix 5** shows the values of individual z scores for each compulsory pesticide and the combined 'Average of the Squared z scores' (AZ^2) for laboratories in Category A (including non-EU countries), which were those laboratories that were able to analyse at least 90 % of the compulsory pesticides in the target pesticides list (13), to detect and quantify at least 90 % of the pesticides present in the Test Item (192), and that did not report any false positive result. A graphical representation of those results for the EU/EFTA laboratories can be found in **Appendix 6**.
One hundred and twenty two of the 160 EU and EFTA laboratories that submitted results were classified into Category A (76 %).

From the AZ^2, 93 % were classed as 'good', 7 % as 'satisfactory' and 1 % as 'unsatisfactory' (Only considering EU and EFTA laboratories).

Of the 38 EU and EFTA laboratories in Category B, four had reported a false positive result. All of them would have been classified into Category A had it not been for this false positive result.

Table 11 shows all the laboratories in Category A (including non-EU laboratories, indicated with §), the number of pesticides reported, the percentage of pesticides analysed from the compulsory target list, the AZ^2 values and their sub classifications. Laboratories that reported false negative results in Category A are marked with the symbol ⊖.

Table 11. Performance and Classification of laboratories in Category A using the AZ^2 formula

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ^2	Classification
1§	15	100	0.1	Good
2	15	100	0.1	Good
3	15	97	0.6	Good
4	15	100	2.3	Satisfactory
6	15	100	1.1	Good
7⊖	13	96	1.3	Good
8	15	100	0.4	Good
10	15	100	0.3	Good
11	15	100	0.1	Good
12	15	99	0.2	Good
13	15	100	0.9	Good
14	15	99	0.1	Good
15	14	100	1.2	Good
16	15	100	0.5	Good
18	15	100	0.1	Good
19	15	100	0.4	Good
22	15	100	1.0	Good
23	15	99	1.1	Good
24	15	100	1.6	Good
26	15	99	2.2	Satisfactory
27	14	92	0.3	Good
28	15	100	0.1	Good
30	15	100	0.5	Good
31	15	100	0.6	Good
32	15	99	0.1	Good
33	15	98	0.2	Good
35	14	96	0.1	Good
37§	15	100	1.6	Good
39	15	100	0.9	Good
41§	15	97	0.3	Good
42	14	92	1.1	Good
43	14	96	0.3	Good
44	15	100	0.1	Good
45	14	97	0.9	Good
46	15	100	0.5	Good

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ[2]	Classification
47	15	97	0.1	Good
48	15	99	1.9	Good
49	15	100	0.2	Good
52	15	97	0.2	Good
53§	15	100	0.2	Good
54	15	100	0.1	Good
55	15	100	0.2	Good
56	14	96	0.4	Good
57	14	97	0.7	Good
60	15	100	0.2	Good
61	15	98	0.4	Good
62§	14	90	0.2	Good
63	15	100	0.1	Good
66	15	100	0.1	Good
67	15	94	0.5	Good
68	15	100	0.2	Good
70	13	91	0.1	Good
71	15	98	0.4	Good
72	14	92	0.1	Good
74	15	100	0.3	Good
76	15	99	0.2	Good
77	15	96	0.2	Good
78	15	100	1.4	Good
79	15	95	1.6	Good
81	15	100	0.2	Good
83	15	100	0.3	Good
84	15	100	0.8	Good
85	15	97	0.1	Good
88	15	100	0.2	Good
89	15	99	0.1	Good
90	15	100	0.2	Good
91§	15	100	0.7	Good
92 ⊖	14	100	1.3	Good
93§	15	99	0.5	Good
95	14	91	1.7	Good
96	15	98	0.4	Good
97	13	93	2.4	Satisfactory
98	15	100	0.4	Good
99	15	100	0.2	Good
100	14	92	0.1	Good
102§	14	98	0.4	Good
103	15	98	0.2	Good
104	15	100	0.1	Good
105	15	100	0.3	Good

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ[2]	Classification
106	14	93	1.6	Good
107	14	93	0.8	Good
112	15	100	0.2	Good
114	14	97	0.5	Good
115	15	99	0.3	Good
116	15	100	0.6	Good
119 ⊖	14	99	1.2	Good
120	15	97	0.2	Good
121	15	100	0.2	Good
123 ⊖	14	97	1.4	Good
124	15	100	0.0	Good
125	14	99	0.1	Good
126	15	100	0.9	Good
127§	15	99	0.3	Good
128	15	100	0.2	Good
129	15	100	0.2	Good
131	15	100	0.5	Good
133§	15	99	1.5	Good
135	14	95	0.2	Good
137	15	99	0.4	Good
139 ⊖	14	99	2.5	Satisfactory
140 ⊖	14	97	1.4	Good
141	15	100	1.8	Good
142	15	100	0.1	Good
143	15	95	0.6	Good
144	15	100	0.4	Good
148	15	100	0.1	Good
150	15	99	0.1	Good
151	15	100	0.4	Good
152 ⊖	13	100	2.4	Satisfactory
153	15	100	0.5	Good
154	15	100	0.2	Good
155	14	91	0.3	Good
156§	15	100	0.8	Good
157	14	97	2.3	Satisfactory
158 ⊖	14	100	10.7	Unsatisfactory
159	14	97	0.6	Good
160	15	92	0.9	Good
162	14	92	0.3	Good
163	15	97	0.3	Good
164	13	90	1.0	Good
165	15	100	2.7	Satisfactory
167	15	100	0.2	Good
169	15	100	0.3	Good

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ[2]	Classification
170§	15	97	0.3	Good
172 ⊖	14	100	2.3	Satisfactory
173	15	100	0.6	Good
174	15	99	0.2	Good
175	15	99	1.8	Good
177	15	98	0.5	Good
178	14	95	0.5	Good
180	13	93	0.2	Good
183	15	100	0.9	Good
184	15	94	0.2	Good
185	15	100	0.6	Good

⊖ Laboratories reporting a false negative result
§ Non-EU/EFTA laboratories

Table 12 shows all the laboratories in Category B (including non-EU laboratories, indicated with §), the number and percentage of results reported, the percentage of pesticides analysed from the compulsory target list and the number of acceptable z scores. Laboratories reporting a false negative are marked with the symbol ⊖ and laboratories reporting a false positive are marked with a '+'.

Table 12. Performance of laboratories in Category B

Lab Code	No. of pesticides detected	% of pesticides detected	% of pesticides analysed from target list	No. of total z scores	No. of acceptable z scores (z score ≤ 2.0)
17 ⊖	10	67	68	11	9
20 +	14	93	95	14	12
21	11	73	56	11	8
25	10	67	65	10	10
29 +	11	73	74	11	5
34	10	67	60	10	10
36§	14	93	87	14	14
38	10	67	53	10	10
40 +	15	100	98	15	15
58 +	15	100	100	15	11
59	11	73	64	11	11
65§	5	33	47	8	5
75	12	80	61	12	12
80 +	14	93	73	14	10
87	12	80	94	12	11
94	14	93	81	14	14
101	14	93	85	14	14
108 ⊖	6	40	34	9	3
109	13	87	76	13	12
110	14	93	87	14	14

Lab Code	No. of pesticides detected	% of pesticides detected	% of pesticides analysed from target list	No. of total z scores	No. of acceptable z scores (z score ≤ 2.0)
111 +	13	87	76	13	12
113 ⊖	12	80	85	13	12
117	1	7	7	1	1
118	11	73	76	11	9
130	3	20	12	3	3
134	11	73	72	11	11
136§	14	93	85	14	13
138 + ⊖	14	93	100	15	14
145	15	100	88	15	15
146	14	93	87	14	14
149 ⊖	12	80	96	14	11
161 ⊖	11	73	67	12	11
166 ⊖	12	80	89	14	7
168	10	67	53	10	10
171	14	93	72	14	14
176	14	93	83	14	13
179	9	60	58	9	8
181	13	87	85	13	13
182	9	60	45	9	9
186 ⊖	10	67	70	11	7
187 ⊖	12	80	100	15	12

⊖ Laboratories reporting a false negative result
+ Laboratories reporting a false positive result
§ Non-EU/EFTA laboratories

The AZ[2] graphical representation for EU/EFTA laboratories classified into Category A can be seen in **Appendix 6**. The EU National Reference Laboratories (NRLs) for Fruits and Vegetables have been plotted using a different colour.

5. CONCLUSIONS

One hundred and seventy-five laboratories agreed to participate in EUPT-FV-26. All of them submitted results. Fifteen did not belong to EU nor EFTA countries, so their results were not considered for the estimation of the assigned value.

Fifteen mandatory and two voluntary pesticides were evaluated in EUPT-FV-26, based on the analysis of banana homogenate.

Of a total number of 2400 possible determinations from EU/EFTA laboratories (160 laboratories by 15 evaluated pesticides), 93 % were reported, 6 % were not analysed and 1 % were not detected (false negative results).

The total number of evaluated z scores for mandatory compounds of laboratories from EU/EFTA countries was 2251, with 95 % of them acceptable, 2 % questionable and 3 % unacceptable.

76 % of the EU and EFTA laboratories that submitted results were classified into Category A. Of them, 93 % were classed as 'good', 7 % as 'satisfactory' and 1 % as 'unsatisfactory'.

The robust standard deviation (CV*) was below 22 % for all the evaluated compounds, with an average value of 15.8 % for the 15 mandatory pesticides evaluated and the two voluntary ones.

Participation in this year's European Proficiency Test 26 involved at least one laboratory from each Member State. Additionally, laboratories from Iceland, Norway and Switzerland participated as EFTA countries. As laid down in paragraph 2 (h) of Article 94 of Regulation (EU) 2017/625, one of the EURL's duties is to collaborate with non-EU laboratories that are responsible for analysing food and feed samples and to help them improve the quality of their analyses. Non-European laboratories from China, Costa Rica, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and United Kingdom participated in EUPT-FV-26.

6. REFERENCES

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5. P. Medina-Pastor, M. Mezcua, C. Rodríguez-Torreblanca, A. R. Fernández-Alba. Laboratory assessment by combined z-score values in proficiency tests: experience gained through the European Union proficiency tests for pesticide residues in fruits and vegetables. Anal. Bioanal. Chem., 2010, 397, 3061–3070.

7. ACKNOWLEDGEMENTS

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The Organiser wishes to thank the members of the Quality Control Group and the Scientific Committee for their invaluable expert advice.

The Organiser wishes to give a special thank-you to the University of Almeria for the use of their facilities.

APPENDIX 1. Homogeneity results

Ametoctradin (mg/kg)		Azoxystrobin (mg/kg)		Bifenthrin (mg/kg)		Chlorpyrifos (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.072	0.082	0.489	0.474	0.169	0.186	0.053	0.059
0.082	0.077	0.548	0.552	0.175	0.158	0.056	0.050
0.083	0.072	0.544	0.583	0.145	0.143	0.047	0.044
0.086	0.085	0.566	0.524	0.142	0.132	0.046	0.045
0.076	0.101	0.564	0.544	0.136	0.144	0.042	0.047
0.075	0.085	0.527	0.585	0.148	0.142	0.047	0.045
0.073	0.076	0.566	0.572	0.152	0.137	0.050	0.046
0.083	0.085	0.565	0.566	0.131	0.137	0.044	0.047
0.074	0.088	0.583	0.563	0.138	0.140	0.047	0.045
0.082	0.080	0.544	0.544	0.138	0.127	0.046	0.041

Cypermethrin (mg/kg)		Diazinon (mg/kg)		Flupyradifurone (mg/kg)		Fluquinconazole (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.149	0.171	0.090	0.086	0.159	0.161	0.074	0.074
0.159	0.149	0.099	0.082	0.162	0.155	0.069	0.069
0.133	0.134	0.087	0.088	0.162	0.159	0.071	0.069
0.134	0.128	0.091	0.101	0.152	0.154	0.071	0.070
0.125	0.138	0.090	0.094	0.156	0.160	0.065	0.066
0.137	0.131	0.099	0.098	0.160	0.168	0.072	0.077
0.144	0.130	0.094	0.087	0.165	0.163	0.079	0.075
0.123	0.128	0.102	0.091	0.160	0.154	0.072	0.069
0.132	0.128	0.085	0.090	0.163	0.158	0.069	0.076
0.129	0.122	0.078	0.088	0.156	0.156	0.069	0.072

Fluxapyroxad (mg/kg)		Monocrotophos (mg/kg)		Myclobutanil (mg/kg)		Omethoate (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.494	0.500	0.051	0.052	0.093	0.085	0.080	0.088
0.572	0.543	0.053	0.052	0.097	0.090	0.088	0.086
0.535	0.594	0.055	0.053	0.087	0.093	0.088	0.088
0.555	0.554	0.050	0.049	0.088	0.084	0.082	0.082
0.519	0.568	0.054	0.052	0.079	0.089	0.087	0.084
0.517	0.541	0.056	0.055	0.088	0.097	0.091	0.088
0.581	0.560	0.054	0.054	0.089	0.095	0.086	0.088
0.531	0.550	0.055	0.053	0.090	0.083	0.090	0.086
0.564	0.579	0.055	0.053	0.091	0.087	0.088	0.085
0.527	0.530	0.055	0.054	0.082	0.082	0.093	0.088

The sample numbers used for this test were: 21, 26, 50, 68, 92, 117, 149, 196, 207, 263.

Pyrimethanil (mg/kg)		Spiroxamine (mg/kg)		Thiabendazol (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.102	0.096	0.224	0.231	0.759	0.790
0.097	0.094	0.234	0.228	0.843	0.859
0.099	0.098	0.225	0.229	0.874	0.873
0.095	0.096	0.229	0.220	0.856	0.845
0.098	0.104	0.231	0.237	0.842	0.851
0.097	0.101	0.224	0.240	0.869	0.881
0.098	0.099	0.222	0.223	0.860	0.859
0.098	0.095	0.226	0.224	0.848	0.853
0.099	0.097	0.227	0.222	0.862	0.851
0.091	0.095	0.219	0.217	0.849	0.838

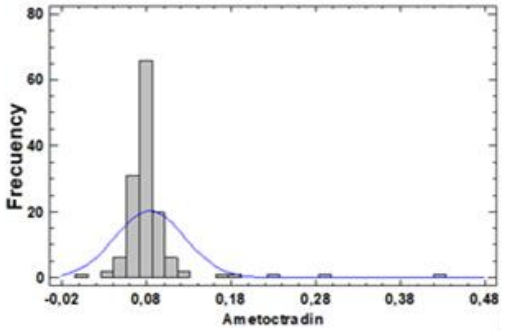
Voluntary Pesticides

Fenpicoxamid (mg/kg)		Metconazole (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.057	0.067	0.098	0.091
0.069	0.070	0.102	0.085
0.066	0.067	0.092	0.083
0.071	0.068	0.093	0.092
0.057	0.066	0.090	0.092
0.067	0.069	0.085	0.096
0.068	0.073	0.096	0.095
0.067	0.067	0.093	0.090
0.058	0.065	0.091	0.104
0.063	0.063	0.082	0.086

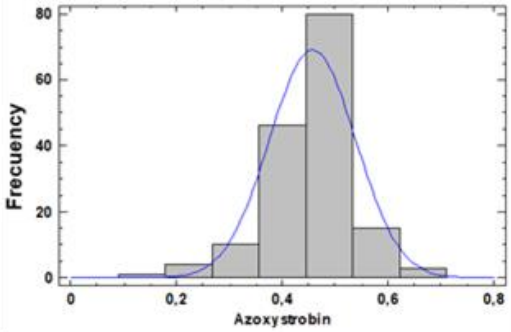
The sample numbers used for this test were: 21, 26, 50, 68, 92, 117, 149, 196, 207, 263.

APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

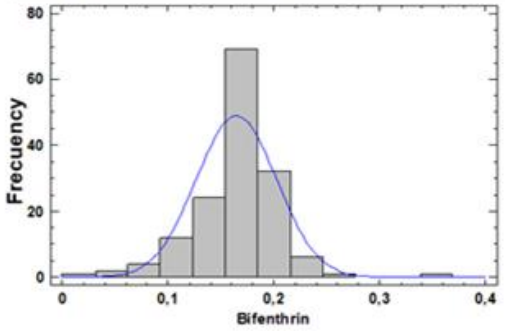
Compound	Assigned value (mg/kg)	CV* (%)	n
Ametoctradin	0,078	17,6	139



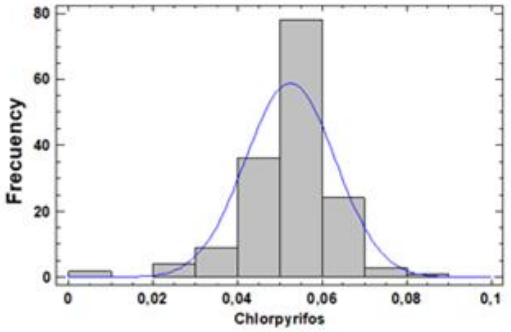
Compound	Assigned value (mg/kg)	CV* (%)	n
Azoxystrobin	0,461	13,7	159



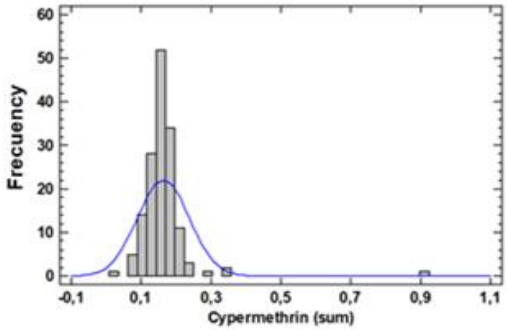
Compound	Assigned value (mg/kg)	CV* (%)	n
Bifenthrin	0,166	17,9	152



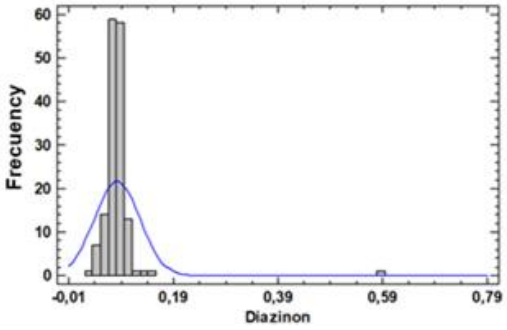
Compound	Assigned value (mg/kg)	CV* (%)	n
Chlorpyrifos	0,052	15,8	157



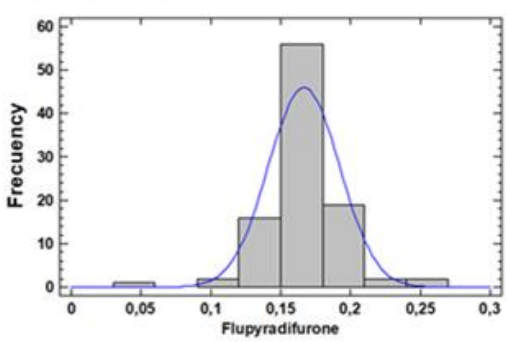
Compound	Assigned value (mg/kg)	CV* (%)	n
Cypermethrin (sum)	0,157	22,1	152



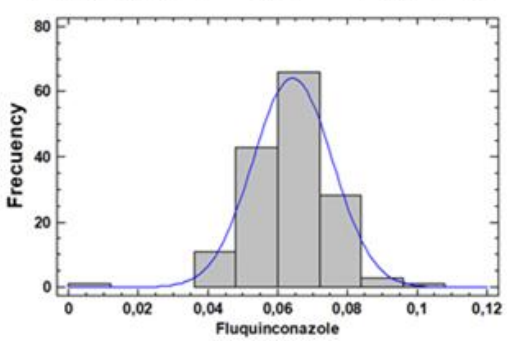
Compound	Assigned value (mg/kg)	CV* (%)	n
Diazinon	0,079	17,4	156



Compound	Assigned value (mg/kg)	CV* (%)	n
Flupyradifurone	0,166	11,9	98

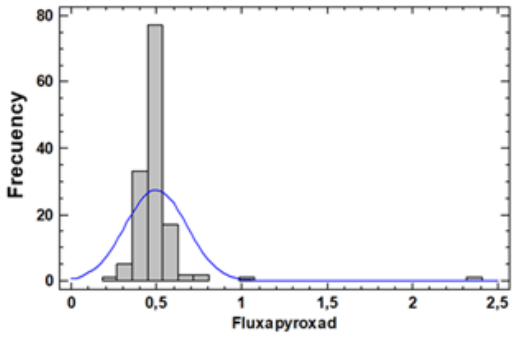


Compound	Assigned value (mg/kg)	CV* (%)	n
Fluquinconazole	0,064	15,8	153

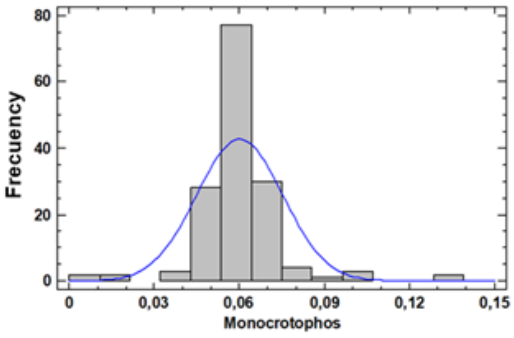


APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

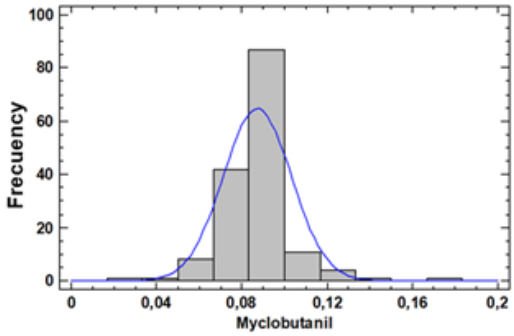
Compound	Assigned value (mg/kg)	CV* (%)	n
Fluxapyroxad	0,478	12,4	139



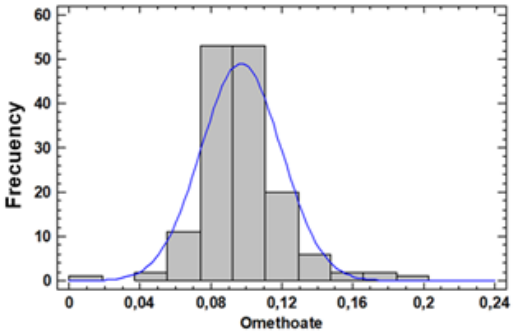
Compound	Assigned value (mg/kg)	CV* (%)	n
Monocrotophos	0,059	14,1	152



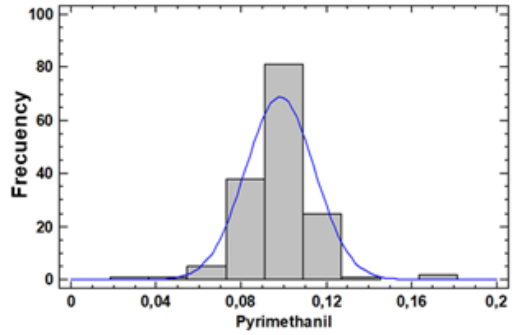
Compound	Assigned value (mg/kg)	CV* (%)	n
Myclobutanil	0,087	12,5	156



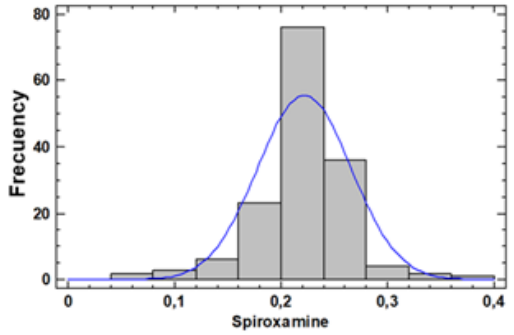
Compound	Assigned value (mg/kg)	CV* (%)	n
Omethoate	0,096	17,5	151



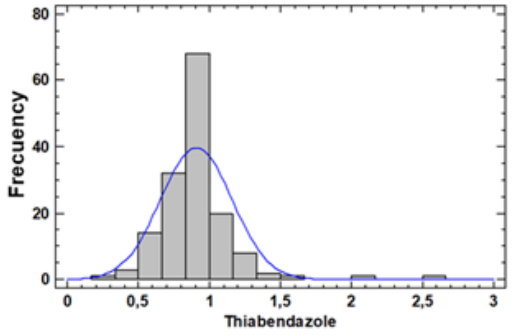
Compound	Assigned value (mg/kg)	CV* (%)	n
Pyrimethanil	0,098	12,3	154



Compound	Assigned value (mg/kg)	CV* (%)	n
Spiroxamine	0,224	13,9	153

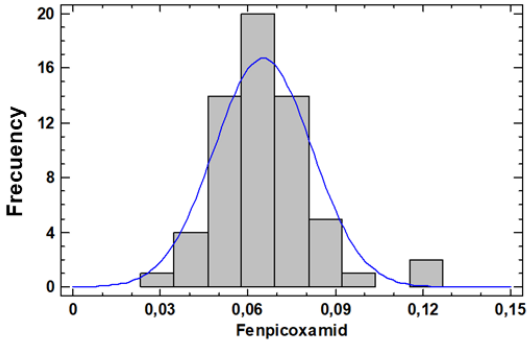


Compound	Assigned value (mg/kg)	CV* (%)	n
Thiabendazole	0,89	18,7	151

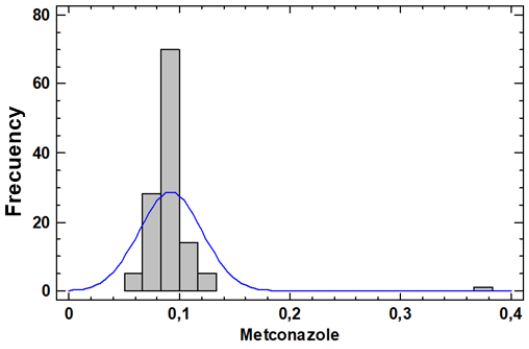


Voluntary compounds

Compound	Assigned value (mg/kg)	CV* (%)	n
Fenpicoxamid	0,064	21,9	61



Compound	Assigned value (mg/kg)	CV* (%)	n
Metconazole	0,09	13,3	123



Results reported by the laboratories for the mandatory pesticides (mg/kg) and their calculated z score value using FFP-RSD 25 %

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Bifenthrin	z score (FFP-RSD 25 %)	Chlorpyrifos	z score (FFP-RSD 25 %)	Cypermethrin (sum)	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Flupyradifurone	z score (FFP-RSD 25 %)	Fluquinconazole	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010		0.010		0.005		0.010		0.005		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0783		0.461		0.166		0.0524		0.157		0.0793		0.166		0.0643		0.478	
1	0.0669	-0.6	0.462	0.0	0.144	-0.5	0.0418	-0.8	0.146	-0.3	0.0725	-0.3	0.179	0.3	0.065	0.0	0.479	0.0
2	0.076	-0.1	0.41	-0.4	0.174	0.2	0.052	0.0	0.165	0.2	0.075	-0.2	0.166	0.0	0.053	-0.7	0.403	-0.6
3	0.0848	0.3	0.44	-0.2	0.195	0.7	0.0577	0.4	0.185	0.7	0.0846	0.3	0.188	0.5	0.0749	0.7	0.625	1.2
4	0.064	-0.7	0.196	-2.3	0.097	-1.7	0.029	-1.8	0.109	-1.2	0.04	-2.0	0.142	-0.6	0.051	-0.8	0.408	-0.6
6	0.11	1.6	0.5	0.3	0.185	0.5	0.058	0.4	0.163	0.2	0.105	1.3	0.165	0.0	0.07	0.4	0.505	0.2
7	ND	-4.0	0.492	0.3	0.174	0.2	0.053	0.0	0.154	-0.1	0.076	-0.2	NA		0.063	-0.1	0.487	0.1
8	0.07	-0.4	0.445	-0.1	0.168	0.0	0.046	-0.5	0.132	-0.6	0.084	0.2	0.142	-0.6	0.048	-1.0	0.408	-0.6
10	0.085	0.3	0.441	-0.2	0.194	0.7	0.059	0.5	0.184	0.7	0.102	1.1	0.182	0.4	0.069	0.3	0.513	0.3
11	0.08	0.1	0.444	-0.1	0.179	0.3	0.062	0.7	0.13	-0.7	0.088	0.4	0.158	-0.2	0.065	0.0	0.415	-0.5
12	0.0796	0.1	0.45	-0.1	0.186	0.5	0.055	0.2	0.15	-0.2	0.093	0.7	0.138	-0.7	0.066	0.1	0.505	0.2
13	0.064	-0.7	0.411	-0.4	0.147	-0.5	0.063	0.8	0.131	-0.7	0.053	-1.3	0.166	0.0	0.048	-1.0	0.385	-0.8
14	0.066	-0.6	0.481	0.2	0.168	0.0	0.051	-0.1	0.16	0.1	0.079	0.0	0.174	0.2	0.058	-0.4	0.478	0.0
15	0.088	0.5	0.403	-0.5	0.068	-2.4	0.031	-1.6	0.084	-1.9	0.071	-0.4	NA		0.058	-0.4	0.409	-0.6
16	0.064	-0.7	0.47	0.1	0.145	-0.5	0.043	-0.7	0.14	-0.4	0.08	0.0	0.132	-0.8	0.045	-1.2	0.415	-0.5
17	NA		0.482	0.2	0.2	0.8	0.055	0.2	0.243	2.2	0.041	-1.9	NA		ND	-4.0	NA	
18	0.0869	0.4	0.452	-0.1	0.174	0.2	0.0551	0.2	0.168	0.3	0.0926	0.7	0.185	0.4	0.0595	-0.3	0.445	-0.3
19	0.082	0.2	0.572	1.0	0.184	0.4	0.058	0.4	0.159	0.1	0.108	1.4	0.196	0.7	0.079	0.9	0.442	-0.3
20	0.072	-0.3	0.345	-1.0	0.147	-0.5	0.058	0.4	0.121	-0.9	0.109	1.5	NA		0.066	0.1	0.496	0.1
21	NA		0.3255	-1.2	0.1575	-0.2	0.0425	-0.8	0.1495	-0.2	0.059	-1.0	NA		0.057	-0.5	NA	
22	0.1	1.1	0.53	0.6	0.21	1.1	0.064	0.9	0.22	1.6	0.097	0.9	0.2	0.8	0.07	0.4	0.52	0.3
23	0.079	0.0	0.378	-0.7	0.0772	-2.1	0.0369	-1.2	0.134	-0.6	0.0572	-1.1	0.189	0.5	0.0463	-1.1	0.371	-0.9
24	0.0465	-1.6	0.235	-2.0	0.124	-1.0	0.0455	-0.5	0.118	-1.0	0.0619	-0.9	0.118	-1.2	0.0426	-1.4	0.343	-1.1
25	NA		0.332	-1.1	0.106	-1.4	0.037	-1.2	0.079	-2.0	0.055	-1.2	NA		NA		NA	
26	0.287	> 5.0	0.341	-1.0	0.175	0.2	0.0499	-0.2	0.085	-1.8	0.0682	-0.6	0.163	-0.1	0.078	0.8	0.473	0.0
27	0.078	0.0	0.49	0.2	0.18	0.3	0.071	1.4	0.18	0.6	0.094	0.7	NA		0.069	0.3	0.5	0.2
28	0.087	0.4	0.438	-0.2	0.157	-0.2	0.054	0.1	0.182	0.6	0.095	0.8	0.178	0.3	0.067	0.2	0.444	-0.3
29	NA		0.2036	-2.2	NA		0.0502	-0.2	0.1532	-0.1	0.0617	-0.9	NA		0.0468	-1.1	NA	
30	0.101	1.2	0.399	-0.5	0.15	-0.4	0.053	0.0	0.18	0.6	0.081	0.1	0.184	0.4	0.082	1.1	0.46	-0.2
31	0.091	0.6	0.518	0.5	0.24	1.8	0.048	-0.3	0.159	0.1	0.062	-0.9	0.163	-0.1	0.071	0.4	0.55	0.6
32	0.068	-0.5	0.475	0.1	0.143	-0.6	0.064	0.9	0.167	0.3	0.077	-0.1	0.166	0.0	0.064	0.0	0.451	-0.2
33	0.0902	0.6	0.4496	-0.1	0.1839	0.4	0.0633	0.8	0.1537	-0.1	0.09	0.5	0.1577	-0.2	0.0624	-0.1	0.4816	0.0
34	NA		0.37	-0.8	0.11	-1.4	0.033	-1.5	0.099	-1.5	0.043	-1.8	NA		NA		NA	
35	0.073	-0.3	0.507	0.4	0.164	-0.1	0.059	0.5	0.142	-0.4	0.085	0.3	NA		0.082	1.1	0.484	0.0
36	NA		0.424	-0.3	0.15	-0.4	0.0495	-0.2	0.159	0.1	0.0797	0.0	0.207	1.0	0.0623	-0.1	0.483	0.0
37	0.151	3.7	0.454	-0.1	0.194	0.7	0.042	-0.8	0.205	1.2	0.034	-2.3	0.167	0.0	0.05	-0.9	0.43	-0.4
38	NA		0.447	-0.1	0.154	-0.3	0.04	-0.9	NA		0.07	-0.5	NA		0.058	-0.4	NA	
39	0.073	-0.3	0.525	0.6	0.171	0.1	0.048	-0.3	0.139	-0.5	0.06	-1.0	0.152	-0.3	0.055	-0.6	0.623	1.2
40	0.111	1.7	0.582	1.0	0.152	-0.3	0.0477	-0.4	0.173	0.4	0.0673	-0.6	0.169	0.1	0.0566	-0.5	0.497	0.2
41	0.0645	-0.7	0.432	-0.3	0.178	0.3	0.0499	-0.2	0.185	0.7	0.0764	-0.1	0.127	-0.9	0.054	-0.6	0.391	-0.7
42	0.066	-0.6	0.5	0.3	0.086	-1.9	0.035	-1.3	0.085	-1.8	0.052	-1.4	NA		0.08	1.0	0.52	0.3
43	0.075	-0.2	0.526	0.6	0.191	0.6	0.055	0.2	0.201	1.1	0.083	0.2	NA		0.082	1.1	0.55	0.6
44	0.075	-0.2	0.48	0.2	0.167	0.0	0.054	0.1	0.159	0.1	0.083	0.2	0.174	0.2	0.06	-0.3	0.501	0.2
45	0.032	-2.4	0.47	0.1	0.189	0.5	0.054	0.1	0.155	-0.1	0.087	0.4	NA		0.054	-0.6	0.49	0.1
46	0.067	-0.6	0.496	0.3	0.135	-0.8	0.043	-0.7	0.123	-0.9	0.07	-0.5	0.155	-0.3	0.056	-0.5	0.551	0.6
47	0.0819	0.2	0.438	-0.2	0.177	0.3	0.0486	-0.3	0.15	-0.2	0.0715	-0.4	0.135	-0.8	0.0688	0.3	0.423	-0.5
48	0.0769	-0.1	0.457	0.0	0.342	4.2	0.0512	-0.1	0.282	3.2	0.0812	0.1	0.167	0.0	0.0618	-0.2	0.467	-0.1
49	0.0643	-0.7	0.41	-0.4	0.16	-0.2	0.055	0.2	0.13	-0.7	0.07	-0.5	0.159	-0.2	0.0576	-0.4	0.401	-0.6
52	0.076	-0.1	0.482	0.2	0.143	-0.6	0.052	0.0	0.125	-0.8	0.092	0.6	0.183	0.4	0.06	-0.3	0.521	0.4
53	0.093	0.7	0.503	0.4	0.179	0.3	0.059	0.5	0.16	0.1	0.092	0.6	0.182	0.4	0.069	0.3	0.566	0.7
54	0.087	0.4	0.481	0.2	0.158	-0.2	0.053	0.0	0.148	-0.2	0.07	-0.5	0.148	-0.4	0.055	-0.6	0.491	0.1
55	0.086	0.4	0.497	0.3	0.148	-0.4	0.0625	0.8	0.159	0.1	0.0884	0.5	0.18	0.3	0.0636	0.0	0.472	-0.1
56	0.073	-0.3	0.524	0.5	0.203	0.9	0.054	0.1	0.197	1.0	0.05	-1.5	NA		0.062	-0.1	0.515	0.3
57	0.095	0.9	0.616	1.3	0.188	0.5	0.066	1.0	0.18	0.6	0.094	0.7	0.196	0.7	0.072	0.5	NA	
58	0.037	-2.1	0.27	-1.7	0.026	-3.4	0.008	-3.4	0.025	-3.4	0.069	-0.5	0.17	0.1	0.064	0.0	0.41	-0.6
59	NA		0.41	-0.4	0.097	-1.7	0.035	-1.3	0.124	-0.8	0.06	-1.0	NA		0.067	0.2	NA	
60	0.0734	-0.3	0.523	0.5	0.184	0.4	0.0592	0.5	0.19	0.8	0.093	0.7	0.164	-0.1	0.0638	0.0	0.464	-0.1
61	0.064	-0.7	0.604	1.2	0.163	-0.1	0.051	-0.1	0.142	-0.4	0.076	-0.2	0.157	-0.2	0.078	0.8	0.456	-0.2
62	0.083	0.2	0.495	0.3	0.191	0.6	0.0595	0.5	0.175	0.5	0.0891	0.5	NA		0.0713	0.4	0.487	0.1
63	0.07	-0.4	0.473	0.1	0.182	0.4	0.054	0.1	0.181	0.6	0.085	0.3	0.176	0.2	0.065	0.0	0.504	0.2
65	NA		0.34	-1.1	0.09	-1.8	ND	-4.0	ND	-4.0	0.09	0.5	NA		NA		NA	
66	0.0772	-0.1	0.523	0.5	0.194	0.7	0.0582	0.4	0.174	0.4	0.0866	0.4	0.148	-0.4	0.0646	0.0	0.501	0.2
67	0.0612	-0.9	0.386	-0.7	0.139	-0.7	0.048	-0.3	0.128	-0.7	0.0688	-0.5	0.119	-1.1	0.0533	-0.7	0.433	-0.4
68	0.071	-0.4	0.469	0.1	0.182	0.4	0.059	0.5	0.182	0.6	0.093	0.7	0.184	0.4	0.065	0.0	0.514	0.3
70	0.0747	-0.2	0.436	-0.2	0.157	-0.2	0.0483	-0.3	0.149	-0.2	0.0685	-0.5	NA		0.0564	-0.5	0.522	0.4
71	0.0844	0.3	0.367	-0.8	0.136	-0.7	0.0461	-0.5	0.165	0.2	0.0664	-0.7	0.155	-0.3	0.0528	-0.7	0.462	-0.1
72	0.0826	0.2	0.346	-1.0	0.166	0.0	0.0521	0.0	0.181	0.6	0.0824	0.2	NA		0.0671	0.2	0.471	-0.1
74	0.083	0.2	0.55	0.8	0.19	0.6	0.052	0.0	0.097	-1.5	0.081	0.1	0.18	0.3	0.074	0.6	0.45	-0.2
75	NA		0.54	0.7	0.21	1.1	0.07	1.3	0.14	-0.4	0.1	1.0	NA		0.078	0.8	NA	

APPENDIX 3. Results (mg/kg) and z scores for FFP-RSD (25 %).

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Bifenthrin	z score (FFP-RSD 25 %)	Chlorpyrifos	z score (FFP-RSD 25 %)	Cypermethrin (sum)	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Flupyradifurone	z score (FFP-RSD 25 %)	Fluquinconazole	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010		0.010		0.005		0.010		0.005		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0783		0.461		0.166		0.0524		0.157		0.0793		0.166		0.0643		0.478	
76	0.076	-0.1	0.497	0.3	0.187	0.5	0.061	0.7	0.178	0.5	0.084	0.2	0.126	-1.0	0.071	0.4	0.488	0.1
77	0.084	0.3	0.45	-0.1	0.17	0.1	0.058	0.4	0.17	0.3	0.088	0.4	0.17	0.1	0.082	1.1	0.45	-0.2
78	0.058	-1.0	0.466	0.0	0.165	0.0	0.055	0.2	0.068	-2.3	0.062	-0.9	0.225	1.4	0.104	2.5	0.454	-0.2
79	0.051	-1.4	0.43	-0.3	0.084	-2.0	0.021	-2.4	0.16	0.1	0.049	-1.5	0.13	-0.9	0.056	-0.5	0.44	-0.3
80	0.088	0.5	0.452	-0.1	0.206	1.0	0.065	1.0	0.355	> 5.0	0.097	0.9	NA		0.095	1.9	0.65	1.4
81	0.0797	0.1	0.5	0.3	0.177	0.3	0.0553	0.2	0.208	1.3	0.0793	0.0	0.171	0.1	0.0623	-0.1	0.476	0.0
83	0.0845	0.3	0.624	1.4	0.181	0.4	0.0633	0.8	0.183	0.7	0.0923	0.7	0.185	0.4	0.0671	0.2	0.514	0.3
84	0.067	-0.6	0.503	0.4	0.123	-1.0	0.045	-0.6	0.091	-1.7	0.068	-0.6	0.206	1.0	0.065	0.0	0.322	-1.3
85	0.0779	0.0	0.46	0.0	0.184	0.4	0.0615	0.7	0.156	0.0	0.0928	0.7	0.173	0.2	0.0675	0.2	0.471	-0.1
87	NA		0.455	-0.1	0.191	0.6	0.059	0.5	0.164	0.2	0.096	0.8	NA		0.058	-0.4	NA	
88	0.096	0.9	0.522	0.5	0.15	-0.4	0.052	0.0	0.158	0.0	0.074	-0.3	0.175	0.2	0.08	1.0	0.532	0.4
89	0.0918	0.7	0.483	0.2	0.174	0.2	0.0498	-0.2	0.176	0.5	0.0845	0.3	0.161	-0.1	0.0649	0.0	0.565	0.7
90	0.084	0.3	0.46	0.0	0.192	0.6	0.053	0.0	0.154	-0.1	0.088	0.4	0.16	-0.2	0.078	0.8	0.467	-0.1
91	0.125	2.4	0.512	0.4	0.162	-0.1	0.042	-0.8	0.131	-0.7	0.071	-0.4	0.16	-0.2	0.047	-1.1	0.546	0.6
92	0.06	-0.9	0.42	-0.4	0.22	1.3	0.048	-0.3	ND	-4.0	0.074	-0.3	0.16	-0.2	0.062	-0.1	0.42	-0.5
93	0.0645	-0.7	0.435	-0.2	0.175	0.2	0.0518	0.0	0.184	0.7	0.0395	-2.0	0.166	0.0	0.0544	-0.6	0.412	-0.6
94	0.069	-0.5	0.44	-0.2	0.16	-0.2	0.054	0.1	0.18	0.6	0.086	0.3	NA		0.065	0.0	0.4	-0.7
95	0.169	4.6	0.407	-0.5	0.133	-0.8	0.042	-0.8	0.142	-0.4	0.08	0.0	NA		0.061	-0.2	0.454	-0.2
96	0.12	2.1	0.44	-0.2	0.172	0.1	0.058	0.4	0.162	0.1	0.084	0.2	0.16	-0.2	0.073	0.5	0.54	0.5
97	0.19	> 5.0	0.47	0.1	0.18	0.3	0.059	0.5	0.188	0.8	0.095	0.8	NA		0.074	0.6	0.52	0.3
98	0.093	0.7	0.549	0.8	0.18	0.3	0.056	0.3	0.167	0.3	0.087	0.4	0.176	0.2	0.074	0.6	0.518	0.3
99	0.063	-0.8	0.48	0.2	0.19	0.6	0.056	0.3	0.168	0.3	0.079	0.0	0.192	0.6	0.07	0.4	0.48	0.0
100	0.0808	0.1	0.467	0.1	0.164	-0.1	0.0521	0.0	0.146	-0.3	0.0786	0.0	NA		0.0593	-0.3	0.481	0.0
101	0.07	-0.4	0.442	-0.2	0.165	0.0	0.053	0.0	0.172	0.4	0.082	0.1	NA		0.066	0.1	0.44	-0.3
102	0.072	-0.3	0.523	0.5	0.224	1.4	0.06	0.6	0.175	0.5	0.103	1.2	NA		0.077	0.8	0.494	0.1
103	0.088	0.5	0.505	0.4	0.179	0.3	0.06	0.6	0.206	1.2	0.09	0.5	0.161	-0.1	0.065	0.0	0.55	0.6
104	0.0667	-0.6	0.413	-0.4	0.162	-0.1	0.0534	0.1	0.167	0.3	0.0869	0.4	0.156	-0.2	0.0683	0.2	0.455	-0.2
105	0.075	-0.2	0.425	-0.3	0.13	-0.9	0.068	1.2	0.115	-1.1	0.085	0.3	0.19	0.6	0.075	0.7	0.485	0.1
106	0.043	-1.8	0.284	-1.5	0.126	-1.0	0.029	-1.8	0.101	-1.4	0.044	-1.8	NA		0.043	-1.3	0.332	-1.2
107	0.08	0.1	0.604	1.2	0.097	-1.7	0.055	0.2	0.126	-0.8	0.084	0.2	NA		0.077	0.8	0.605	1.1
108	NA		0.508	0.4	0.222	1.3	0.062	0.7	0.348	4.9	0.141	3.1	NA		NA		NA	
109	0.072	-0.3	0.46	0.0	0.13	-0.9	0.046	-0.5	0.12	-0.9	0.079	0.0	NA		0.06	-0.3	0.78	2.5
110	0.067	-0.6	0.34	-1.1	0.19	0.6	0.041	-0.9	0.18	0.6	0.072	-0.4	NA		0.045	-1.2	0.38	-0.8
111	0.098	1.0	0.4	-0.5	0.166	0.0	0.04	-0.9	0.212	1.4	0.085	0.3	NA		0.06	-0.3	0.56	0.7
112	0.0737	-0.2	0.453	-0.1	0.156	-0.2	0.0515	-0.1	0.153	-0.1	0.0698	-0.5	0.146	-0.5	0.0612	-0.2	0.473	0.0
113	NA		0.47	0.1	0.13	-0.9	0.046	-0.5	0.13	-0.7	0.068	-0.6	NA		0.047	-1.1	ND	-4.0
114	0.0755	-0.1	0.564	0.9	0.168	0.0	0.061	0.7	0.188	0.8	0.0805	0.1	NA		0.0655	0.1	0.441	-0.3
115	0.1	1.1	0.48	0.2	0.16	-0.2	0.053	0.0	0.18	0.6	0.07	-0.5	0.14	-0.6	0.05	-0.9	0.48	0.0
116	0.075	-0.2	0.444	-0.1	0.06	-2.6	0.046	-0.5	0.106	-1.3	0.079	0.0	0.156	-0.2	0.059	-0.3	0.451	-0.2
117	NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	NA		0.435	-0.2	0.199	0.8	0.053	0.0	0.192	0.9	0.062	-0.9	NA		0.045	-1.2	NA	
119	0.085	0.3	0.474	0.1	0.155	-0.3	0.05	-0.2	0.164	0.2	0.074	-0.3	ND	-4.0	0.079	0.9	0.505	0.2
120	0.085	0.3	0.513	0.4	0.189	0.5	0.052	0.0	0.178	0.5	0.083	0.2	0.181	0.4	0.065	0.0	0.571	0.8
121	0.077	-0.1	0.51	0.4	0.197	0.7	0.053	0.0	0.206	1.2	0.067	-0.6	0.162	-0.1	0.065	0.0	0.471	-0.1
123	0.0827	0.2	0.542	0.7	0.202	0.9	0.0586	0.5	0.179	0.6	0.0837	0.2	ND	-4.0	0.0825	1.1	0.505	0.2
124	0.067	-0.6	0.485	0.2	0.159	-0.2	0.052	0.0	0.154	-0.1	0.081	0.1	0.175	0.2	0.063	-0.1	0.461	-0.1
125	0.068	-0.5	0.468	0.1	0.17	0.1	0.054	0.1	0.162	0.1	0.071	-0.4	NA		0.059	-0.3	0.45	-0.2
126	0.111	1.7	0.496	0.3	0.105	-1.5	0.0547	0.2	0.106	-1.3	0.07	-0.5	0.242	1.8	0.074	0.6	0.462	-0.1
127	0.094	0.8	0.499	0.3	0.195	0.7	0.065	1.0	0.175	0.5	0.083	0.2	0.165	0.0	0.067	0.2	0.555	0.6
128	0.076	-0.1	0.459	0.0	0.167	0.0	0.048	-0.3	0.116	-1.0	0.077	-0.1	0.16	-0.2	0.065	0.0	0.442	-0.3
129	0.084	0.3	0.407	-0.5	0.167	0.0	0.051	-0.1	0.133	-0.6	0.064	-0.8	0.158	-0.2	0.057	-0.5	0.463	-0.1
130	NA		0.65	1.6	NA		NA		NA		NA		NA		NA		NA	
131	0.066	-0.6	0.445	-0.1	0.18	0.3	0.055	0.2	0.217	1.5	0.104	1.2	0.138	-0.7	0.054	-0.6	0.42	-0.5
133	0.068	-0.5	0.52	0.5	0.18	0.3	0.034	-1.4	0.113	-1.1	0.01	-3.5	0.17	0.1	0.051	-0.8	0.381	-0.8
134	0.078	0.0	0.427	-0.3	0.17	0.1	0.055	0.2	0.15	-0.2	0.083	0.2	NA		0.07	0.4	NA	
135	0.0673	-0.6	0.443	-0.2	0.123	-1.0	0.0401	-0.9	0.136	-0.5	0.0715	-0.4	NA		0.0568	-0.5	0.479	0.0
136	0.138	3.0	0.336	-1.1	0.149	-0.4	0.052	0.0	0.126	-0.8	0.077	-0.1	NA		0.048	-1.0	0.344	-1.1
137	0.073	-0.3	0.405	-0.5	0.171	0.1	0.064	0.9	0.173	0.4	0.083	0.2	0.181	0.4	0.084	1.2	0.424	-0.5
138	0.086	0.4	0.436	-0.2	0.121	-1.1	0.057	0.3	0.146	-0.3	0.087	0.4	ND	-4.0	0.054	-0.6	0.464	-0.1
139	0.122	2.2	0.406	-0.5	ND	-4.0	0.0497	-0.2	0.126	-0.8	0.0747	-0.2	0.133	-0.8	0.0531	-0.7	0.391	-0.7
140	0.079	0.0	0.415	-0.4	0.19	0.6	0.065	1.0	0.185	0.7	0.09	0.5	ND	-4.0	0.08	1.0	0.428	-0.4
141	0.078	0.0	0.52	0.5	0.156	-0.2	0.0466	-0.4	0.194	0.9	0.071	-0.4	0.17	0.1	0.066	0.1	0.49	0.1
142	0.0724	-0.3	0.479	0.2	0.163	-0.1	0.0463	-0.5	0.15	-0.2	0.0709	-0.4	0.17	0.1	0.058	-0.4	0.46	-0.2
143	0.061	-0.9	0.4	-0.5	0.12	-1.1	0.045	-0.6	0.11	-1.2	0.055	-1.2	0.15	-0.4	0.057	-0.5	0.44	-0.3
144	0.069	-0.5	0.41	-0.4	0.151	-0.4	0.05	-0.2	0.168	0.3	0.074	-0.3	0.21	1.0	0.096	2.0	0.527	0.4
145	0.0754	-0.2	0.359	-0.9	0.192	0.6	0.066	1.0	0.212	1.4	0.0931	0.7	0.201	0.8	0.0707	0.4	0.342	-1.1
146	0.0818	0.2	0.546	0.7	0.219	1.3	0.0667	1.1	0.176	0.5	0.106	1.3	NA		0.0699	0.3	0.516	0.3
148	0.082	0.2	0.419	-0.4	0.157	-0.2	0.051	-0.1	0.159	0.1	0.084	0.2	0.16	-0.2	0.068	0.2	0.507	0.2
149	0.072	-0.3	0.437	-0.2	0.172	0.1	0.06	0.6	0.912	> 5.0	ND	-4.0	NA		0.075	0.7	ND	-4.0
150	0.066	-0.6	0.475	0.1	0.204	0.9	0.059	0.5	0.15	-0.2	0.074	-0.3	0.164	-0.1	0.068	0.2	0.487	0.1
151	0.053	-1.3	0.524	0.5	0.149	-0.4	0.054	0.1	0.221	1.6	0.075	-0.2	0.176	0.2	0.078	0.8	0.442	-0.3
152	0.074	-0.2	0.436	-0.2	0.156	-0.2	0.048	-0.3	0.095	-1.6	ND	-4.0	0.159	-0.2	0.064	0.0	0.444	-0.3

APPENDIX 3. Results (mg/kg) and z scores for FFP-RSD (25 %).

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Bifenthrin	z score (FFP-RSD 25 %)	Chlorpyrifos	z score (FFP-RSD 25 %)	Cypermethrin (sum)	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Flupyradifurone	z score (FFP-RSD 25 %)	Fluquinconazole	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010		0.010		0.005		0.010		0.005		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0783		0.461		0.166		0.0524		0.157		0.0793		0.166		0.0643		0.478	
153	0.07	-0.4	0.44	-0.2	0.19	0.6	0.057	0.3	0.17	0.3	0.07	-0.5	0.18	0.3	0.061	-0.2	0.49	0.1
154	0.0749	-0.2	0.462	0.0	0.136	-0.7	0.0489	-0.3	0.118	-1.0	0.0769	-0.1	0.154	-0.3	0.0584	-0.4	0.487	0.1
155	0.08	0.1	0.483	0.2	0.223	1.4	0.053	0.0	0.161	0.1	0.0963	0.9	NA		0.073	0.5	0.512	0.3
156	0.06161	-0.9	0.44261	-0.2	0.14727	-0.5	0.03941	-1.0	0.1807	0.6	0.03091	-2.4	0.18567	0.5	0.06233	-0.1	0.42548	-0.4
157	0.233	> 5.0	0.412	-0.4	0.178	0.3	0.0465	-0.5	0.167	0.3	0.0685	-0.5	NA		0.0533	-0.7	0.613	1.1
158	0.01	-3.5	0.1	-3.1	0.01	-3.8	0.01	-3.2	0.011	-3.7	0.026	-2.7	0.052	-2.7	0.011	-3.3	0.23	-2.1
159	0.0487	-1.5	0.463	0.0	0.122	-1.1	0.0406	-0.9	0.0981	-1.5	0.0727	-0.3	NA		0.0616	-0.2	0.448	-0.3
160	0.0725	-0.3	0.496	0.3	0.157	-0.2	0.0829	2.3	0.208	1.3	0.12	2.1	0.161	-0.1	0.0732	0.6	0.473	0.0
161	NA		0.671	1.8	0.157	-0.2	0.0528	0.0	0.114	-1.1	0.0739	-0.3	NA		0.0562	-0.5	NA	
162	0.083	0.2	0.495	0.3	0.197	0.7	0.063	0.8	0.14	-0.4	0.095	0.8	NA		0.071	0.4	0.55	0.6
163	0.073	-0.3	0.4	-0.5	0.18	0.3	0.052	0.0	0.15	-0.2	0.073	-0.3	0.14	-0.6	0.05	-0.9	0.36	-1.0
164	NA		0.478	0.1	0.17	0.1	0.037	-1.2	0.148	-0.2	0.038	-2.1	NA		0.064	0.0	0.497	0.2
165	0.1	1.1	0.36	-0.9	0.054	-2.7	0.053	0.0	0.15	-0.2	0.075	-0.2	0.25	2.0	0.053	-0.7	0.8	2.7
166	0.42	> 5.0	0.503	0.4	0.181	0.4	0.059	0.5	ND	-4.0	0.583	> 5.0	NA		0.059	-0.3	2.34	> 5.0
167	0.085	0.3	0.524	0.5	0.196	0.7	0.0568	0.3	0.17	0.3	0.0914	0.6	0.16	-0.2	0.0632	-0.1	0.549	0.6
168	NA		0.466	0.0	0.17	0.1	0.052	0.0	0.15	-0.2	0.075	-0.2	NA		0.062	-0.1	0.437	-0.3
169	0.074	-0.2	0.355	-0.9	0.153	-0.3	0.06	0.6	0.161	0.1	0.096	0.8	0.163	-0.1	0.066	0.1	0.37	-0.9
170	0.08	0.1	0.55	0.8	0.185	0.5	0.062	0.7	0.145	-0.3	0.086	0.3	0.16	-0.2	0.07	0.4	0.485	0.1
171	0.092	0.7	0.411	-0.4	0.177	0.3	0.057	0.3	0.181	0.6	0.086	0.3	NA		0.058	-0.4	0.408	-0.6
172	0.113	1.8	0.335	-1.1	ND	-4.0	0.051	-0.1	0.134	-0.6	0.074	-0.3	0.163	-0.1	0.056	-0.5	0.312	-1.4
173	0.1	1.1	0.548	0.8	0.178	0.3	0.077	1.9	0.147	-0.3	0.102	1.1	0.183	0.4	0.075	0.7	0.521	0.4
174	0.07	-0.4	0.457	0.0	0.192	0.6	0.065	1.0	0.164	0.2	0.089	0.5	0.161	-0.1	0.073	0.5	0.472	-0.1
175	0.0665	-0.6	0.462	0.0	0.162	-0.1	0.0446	-0.6	0.164	0.2	0.073	-0.3	0.169	0.1	0.0633	-0.1	0.495	0.1
176	0.0763	-0.1	0.588	1.1	0.2464	1.9	0.0654	1.0	0.1912	0.9	0.1267	2.4	NA		0.069	0.3	0.5025	0.2
177	0.094	0.8	0.522	0.5	0.227	1.5	0.062	0.7	0.225	1.7	0.075	-0.2	0.165	0.0	0.067	0.2	0.568	0.7
178	0.041	-1.9	0.505	0.4	0.156	-0.2	0.057	0.3	0.113	-1.1	0.089	0.5	NA		0.056	-0.5	0.563	0.7
179	0.085	0.3	0.604	1.2	NA		NA		NA		0.089	0.5	0.211	1.1	NA		0.998	4.3
180	0.078	0.0	0.414	-0.4	NA		0.0571	0.4	0.16	0.1	0.088	0.4	NA		0.0685	0.3	0.493	0.1
181	0.107	1.5	0.461	0.0	0.126	-1.0	0.062	0.7	0.11	-1.2	0.081	0.1	NA		0.072	0.5	NA	
182	NA		0.49	0.2	0.19	0.6	0.055	0.2	NA		0.092	0.6	NA		0.072	0.5	0.504	0.2
183	0.07	-0.4	0.5	0.3	0.18	0.3	0.05	-0.2	0.15	-0.2	0.08	0.0	0.15	-0.4	0.07	0.4	0.49	0.1
184	0.079	0.0	0.52	0.5	0.17	0.1	0.046	-0.5	0.13	-0.7	0.069	-0.5	0.17	0.1	0.069	0.3	0.63	1.3
185	0.111	1.7	0.535	0.6	0.185	0.5	0.0754	1.8	0.195	1.0	0.081	0.1	0.166	0.0	0.0664	0.1	0.554	0.6
186	NA		0.25	-1.8	0.117	-1.2	0.022	-2.3	0.243	2.2	0.07	-0.5	NA		0.041	-1.5	NA	
187	ND	-4.0	0.49	0.2	0.151	-0.4	0.0523	0.0	0.167	0.3	0.0766	-0.1	ND	-4.0	0.0559	-0.5	ND	-4.0

NA: Not analysed ND: Not detected (False negative)

Lab Code	Monocrotophos	z score (FFP-RSD 25 %)	Myclobutanil	z score (FFP-RSD 25 %)	Omethoate	z score (FFP-RSD 25 %)	Pyrimethanil	z score (FFP-RSD 25 %)	Spiroxamine	z score (FFP-RSD 25 %)	Thiabendazole	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.005		0.010		0.003		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0594		0.0869		0.0957		0.0979		0.224		0.890	
1	0.061	0.1	0.0837	-0.1	0.0905	-0.2	0.0931	-0.2	0.214	-0.2	0.813	-0.3
2	0.062	0.2	0.084	-0.1	0.098	0.1	0.103	0.2	0.211	-0.2	1.02	0.6
3	0.0561	-0.2	0.105	0.8	0.126	1.3	0.104	0.2	0.258	0.6	1.2	1.4
4	0.045	-1.0	0.055	-1.5	0.173	3.2	0.073	-1.0	0.182	-0.7	0.666	-1.0
6	0.06	0.0	0.095	0.4	0.087	-0.4	0.105	0.3	0.37	2.6	1.32	1.9
7	0.047	-0.8	0.094	0.3	0.077	-0.8	0.102	0.2	0.226	0.0	0.84	-0.2
8	0.074	1.0	0.079	-0.4	0.113	0.7	0.112	0.6	0.272	0.9	0.658	-1.0
10	0.049	-0.7	0.103	0.7	0.088	-0.3	0.093	-0.2	0.232	0.1	0.658	-1.0
11	0.065	0.4	0.088	0.0	0.105	0.4	0.096	-0.1	0.214	-0.2	0.821	-0.3
12	0.061	0.1	0.104	0.8	0.0865	-0.4	0.095	-0.1	0.245	0.4	0.854	-0.2
13	0.058	-0.1	0.086	0.0	0.137	1.7	0.109	0.5	0.35	2.3	0.946	0.3
14	0.068	0.6	0.086	0.0	0.094	-0.1	0.089	-0.4	0.225	0.0	0.972	0.4
15	0.042	-1.2	0.09	0.1	0.067	-1.2	0.098	0.0	0.17	-1.0	0.82	-0.3
16	0.076	1.1	0.066	-1.0	0.082	-0.6	0.102	0.2	0.197	-0.5	0.778	-0.5
17	0.045	-1.0	0.095	0.4	0.081	-0.6	0.106	0.3	0.215	-0.2	NA	
18	0.0624	0.2	0.0903	0.2	0.0878	-0.3	0.103	0.2	0.23	0.1	0.81	-0.4
19	0.048	-0.8	0.094	0.3	0.102	0.3	0.11	0.5	0.225	0.0	0.777	-0.5
20	0.055	-0.3	0.124	1.7	0.194	4.1	0.168	2.9	0.223	0.0	0.949	0.3
21	0.02	-2.7	0.071	-0.7	0.0375	-2.4	0.085	-0.5	NA		0.4	-2.2
22	0.071	0.8	0.12	1.5	0.11	0.6	0.12	0.9	0.27	0.8	1.2	1.4
23	0.0593	0.0	0.0612	-1.2	0.0817	-0.6	0.0721	-1.1	0.143	-1.4	0.599	-1.3
24	0.0529	-0.4	0.0589	-1.3	0.0699	-1.1	0.0727	-1.0	0.111	-2.0	0.656	-1.1
25	0.056	-0.2	0.055	-1.5	0.059	-1.5	0.092	-0.2	NA		1.015	0.6
26	0.0599	0.0	0.0783	-0.4	0.101	0.2	0.0892	-0.4	0.149	-1.3	0.768	-0.5
27	0.062	0.2	0.088	0.0	0.1	0.2	0.096	-0.1	0.25	0.5	0.97	0.4
28	0.057	-0.2	0.089	0.1	0.086	-0.4	0.089	-0.4	0.225	0.0	0.773	-0.5
29	0.1385	> 5.0	0.1493	2.9	2.3311	> 5.0	0.1795	3.3	0.3475	2.2	1.0066	0.5
30	0.057	-0.2	0.118	1.4	0.083	-0.5	0.085	-0.5	0.259	0.6	0.691	-0.9
31	0.049	-0.7	0.104	0.8	0.077	-0.8	0.101	0.1	0.206	-0.3	1.222	1.5
32	0.059	0.0	0.089	0.1	0.092	-0.2	0.094	-0.2	0.215	-0.2	0.85	-0.2
33	0.0651	0.4	0.0934	0.3	0.0972	0.1	0.1012	0.1	0.2587	0.6	0.9654	0.3
34	0.049	-0.7	0.05	-1.7	0.085	-0.4	0.075	-0.9	NA		0.99	0.4
35	0.06	0.0	0.089	0.1	0.1	0.2	0.105	0.3	0.219	-0.1	0.91	0.1
36	0.0648	0.4	0.096	0.4	0.098	0.1	0.0798	-0.7	0.207	-0.3	0.815	-0.3
37	0.05	-0.6	0.09	0.1	0.085	-0.4	0.095	-0.1	0.19	-0.6	0.9	0.0
38	0.07	0.7	0.083	-0.2	0.077	-0.8	NA		0.199	-0.4	0.763	-0.6
39	0.069	0.6	0.077	-0.5	0.092	-0.2	0.097	0.0	0.238	0.3	1.589	3.1
40	0.0799	1.4	0.0762	-0.5	0.0848	-0.5	0.126	1.1	0.215	-0.2	0.995	0.5
41	0.0518	-0.5	0.0742	-0.6	0.0803	-0.6	0.0922	-0.2	0.2	-0.4	0.893	0.0
42	0.064	0.3	0.075	-0.5	0.081	-0.6	0.072	-1.1	0.165	-1.0	0.873	-0.1
43	0.055	-0.3	0.086	0.0	0.111	0.6	0.105	0.3	0.223	0.0	0.844	-0.2
44	0.069	0.6	0.093	0.3	0.112	0.7	0.1	0.1	0.248	0.4	1.015	0.6
45	0.06	0.0	0.089	0.1	0.141	1.9	0.101	0.1	0.23	0.1	0.502	-1.7
46	0.081	1.5	0.078	-0.4	0.095	0.0	0.125	1.1	0.224	0.0	1.012	0.5
47	0.0585	-0.1	0.0878	0.0	0.0853	-0.4	0.079	-0.8	0.232	0.1	0.82	-0.3
48	0.0642	0.3	0.0946	0.4	0.0902	-0.2	0.097	0.0	0.23	0.1	0.963	0.3
49	0.0535	-0.4	0.0824	-0.2	0.105	0.4	0.0961	-0.1	0.199	-0.4	0.876	-0.1
52	0.052	-0.5	0.093	0.3	0.101	0.2	0.105	0.3	0.235	0.2	0.926	0.2
53	0.067	0.5	0.094	0.3	0.106	0.4	0.087	-0.4	0.201	-0.4	1.024	0.6
54	0.056	-0.2	0.071	-0.7	0.099	0.1	0.084	-0.6	0.246	0.4	0.918	0.1
55	0.0567	-0.2	0.0943	0.3	0.085	-0.4	0.101	0.1	0.256	0.6	1.08	0.9
56	0.058	-0.1	0.088	0.0	0.106	0.4	0.11	0.5	0.268	0.8	0.781	-0.5
57	0.071	0.8	0.102	0.7	0.116	0.9	0.122	1.0	0.274	0.9	1.121	1.0
58	0.05	-0.6	0.077	-0.5	0.073	-0.9	0.098	0.0	0.16	-1.1	0.63	-1.2
59	NA		0.085	-0.1	0.079	-0.7	0.091	-0.3	0.205	-0.3	0.74	-0.7
60	0.0577	-0.1	0.0924	0.3	0.114	0.8	0.106	0.3	0.25	0.5	0.887	0.0
61	0.067	0.5	0.11	1.1	0.107	0.5	0.104	0.2	0.262	0.7	1.111	1.0
62	0.069	0.6	0.0973	0.5	0.0976	0.1	0.0941	-0.2	0.258	0.6	1.083	0.9
63	0.055	-0.3	0.09	0.1	0.095	0.0	0.106	0.3	0.193	-0.5	0.926	0.2
65	NA		NA		NA		0.08	-0.7	ND	-4.0	1.02	0.6
66	0.0594	0.0	0.0842	-0.1	0.0828	-0.5	0.0947	-0.1	0.235	0.2	0.954	0.3
67	0.0729	0.9	0.0785	-0.4	0.0693	-1.1	0.0894	-0.3	0.196	-0.5	0.713	-0.8
68	0.063	0.2	0.088	0.0	0.102	0.3	0.1	0.1	0.231	0.1	1.16	1.2
70	0.0647	0.4	0.0791	-0.4	0.0918	-0.2	0.0971	0.0	0.211	-0.2	NA	
71	0.0581	-0.1	0.057	-1.4	0.073	-0.9	0.0894	-0.3	0.215	-0.2	0.836	-0.2
72	0.0633	0.3	0.0861	0.0	0.0952	0.0	0.105	0.3	0.194	-0.5	0.945	0.2
74	0.061	0.1	0.082	-0.2	0.097	0.1	0.09	-0.3	0.2	-0.4	0.95	0.3
75	0.06	0.0	0.095	0.4	0.11	0.6	0.11	0.5	0.22	-0.1	1.11	1.0
76	0.063	0.2	0.097	0.5	0.106	0.4	0.104	0.2	0.235	0.2	0.941	0.2
77	0.053	-0.4	0.078	-0.4	0.12	1.0	0.089	-0.4	0.22	-0.1	0.89	0.0
78	0.062	0.2	0.092	0.2	0.1	0.2	0.096	-0.1	0.313	1.6	0.511	-1.7

APPENDIX 3. Results (mg/kg) and z scores for FFP-RSD (25 %).

Lab Code	Monocrotophos	z score (FFP-RSD 25 %)	Myclobutanil	z score (FFP-RSD 25 %)	Omethoate	z score (FFP-RSD 25 %)	Pyrimethanil	z score (FFP-RSD 25 %)	Spiroxamine	z score (FFP-RSD 25 %)	Thiabendazole	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.005		0.010		0.003		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0594		0.0869		0.0957		0.0979		0.224		0.890	
79	0.052	-0.5	0.061	-1.2	0.071	-1.0	0.054	-1.8	0.16	-1.1	0.6	-1.3
80	0.135	> 5.0	0.121	1.6	0.153	2.4	0.098	0.0	0.263	0.7	1.366	2.1
81	0.055	-0.3	0.089	0.1	0.095	0.0	0.104	0.2	0.223	0.0	1.01	0.5
83	0.0589	0.0	0.0874	0.0	0.0889	-0.3	0.104	0.2	0.233	0.2	0.961	0.3
84	0.039	-1.4	0.067	-0.9	0.093	-0.1	0.077	-0.9	0.209	-0.3	0.673	-1.0
85	0.065	0.4	0.0933	0.3	0.099	0.1	0.0997	0.1	0.249	0.5	0.97	0.4
87	0.042	-1.2	0.089	0.1	0.042	-2.2	0.113	0.6	0.207	-0.3	1.273	1.7
88	0.067	0.5	0.078	-0.4	0.097	0.1	0.082	-0.7	0.252	0.5	0.969	0.4
89	0.062	0.2	0.09	0.1	0.0918	-0.2	0.089	-0.4	0.194	-0.5	0.91	0.1
90	0.07	0.7	0.087	0.0	0.09	-0.2	0.091	-0.3	0.222	0.0	0.684	-0.9
91	0.069	0.6	0.08	-0.3	0.089	-0.3	0.08	-0.7	0.2	-0.4	0.779	-0.5
92	0.057	-0.2	0.073	-0.6	0.084	-0.5	0.087	-0.4	0.21	-0.2	0.86	-0.1
93	0.0457	-0.9	0.0839	-0.1	0.0957	0.0	0.0912	-0.3	0.182	-0.7	0.718	-0.8
94	0.047	-0.8	0.082	-0.2	0.098	0.1	0.096	-0.1	0.22	-0.1	0.68	-0.9
95	0.068	0.6	0.08	-0.3	0.091	-0.2	0.088	-0.4	0.221	0.0	1.05	0.7
96	0.063	0.2	0.09	0.1	0.099	0.1	0.098	0.0	0.23	0.1	0.82	-0.3
97	0.067	0.5	0.11	1.1	0.097	0.1	0.11	0.5	0.32	1.7	NA	
98	0.08	1.4	0.09	0.1	0.123	1.1	0.095	-0.1	0.221	0.0	1.034	0.6
99	0.054	-0.4	0.086	0.0	0.125	1.2	0.098	0.0	0.21	-0.2	0.96	0.3
100	0.0538	-0.4	0.0825	-0.2	0.0876	-0.3	0.0905	-0.3	0.196	-0.5	0.835	-0.2
101	0.056	-0.2	0.084	-0.1	0.073	-0.9	0.074	-1.0	0.205	-0.3	0.695	-0.9
102	0.067	0.5	0.102	0.7	0.097	0.1	0.103	0.2	0.247	0.4	1.01	0.5
103	0.052	-0.5	0.084	-0.1	0.103	0.3	0.101	0.1	0.218	-0.1	0.881	0.0
104	0.0642	0.3	0.0724	-0.7	0.111	0.6	0.0936	-0.2	0.204	-0.4	0.941	0.2
105	0.055	-0.3	0.09	0.1	0.098	0.1	0.1	0.1	0.21	-0.2	0.94	0.2
106	0.05	-0.6	0.1	0.6	0.117	0.9	0.126	1.1	0.158	-1.2	0.773	-0.5
107	0.05	-0.6	0.108	1.0	0.13	1.4	0.107	0.4	0.247	0.4	0.855	-0.2
108	ND	-4.0	0.177	4.1	ND	-4.0	ND	-4.0	NA		NA	
109	0.053	-0.4	0.0996	0.6	0.13	1.4	0.0902	-0.3	0.22	-0.1	NA	
110	0.043	-1.1	0.069	-0.8	0.063	-1.4	0.076	-0.9	0.17	-1.0	0.56	-1.5
111	0.061	0.1	NA		0.086	-0.4	0.076	-0.9	0.077	-2.6	0.765	-0.6
112	0.0597	0.0	0.0804	-0.3	0.113	0.7	0.0724	-1.0	0.23	0.1	0.888	0.0
113	0.053	-0.4	0.07	-0.8	0.077	-0.8	0.092	-0.2	0.22	-0.1	0.93	0.2
114	0.0895	2.0	0.0885	0.1	0.105	0.4	0.112	0.6	0.223	0.0	0.664	-1.0
115	0.064	0.3	0.077	-0.5	0.096	0.0	0.088	-0.4	0.22	-0.1	1.04	0.7
116	0.062	0.2	0.084	-0.1	0.095	0.0	0.106	0.3	0.214	-0.2	0.879	-0.1
117	NA		NA		NA		NA		NA		0.891	0.0
118	0.059	0.0	NA		0.157	2.6	0.09	-0.3	0.098	-2.2	0.659	-1.0
119	0.06	0.0	0.083	-0.2	0.083	-0.5	0.099	0.0	0.193	-0.5	0.893	0.0
120	0.066	0.4	0.089	0.1	0.095	0.0	0.103	0.2	0.256	0.6	0.902	0.1
121	0.057	-0.2	0.094	0.3	0.113	0.7	0.11	0.5	0.239	0.3	0.884	0.0
123	0.05	-0.6	0.0911	0.2	0.0772	-0.8	0.112	0.6	0.223	0.0	0.888	0.0
124	0.063	0.2	0.084	-0.1	0.101	0.2	0.094	-0.2	0.214	-0.2	0.907	0.1
125	0.05	-0.6	0.091	0.2	0.079	-0.7	0.097	0.0	0.218	-0.1	0.819	-0.3
126	0.0592	0.0	0.061	-1.2	0.11	0.6	0.109	0.5	0.259	0.6	1.126	1.1
127	0.069	0.6	0.097	0.5	0.104	0.3	0.092	-0.2	0.247	0.4	0.993	0.5
128	0.065	0.4	0.08	-0.3	0.092	-0.2	0.084	-0.6	0.192	-0.6	1.08	0.9
129	0.061	0.1	0.07	-0.8	0.08	-0.7	0.088	-0.4	0.183	-0.7	0.809	-0.4
130	NA		0.09	0.1	NA		0.14	1.7	NA		NA	
131	0.053	-0.4	0.097	0.5	0.078	-0.7	0.095	-0.1	0.201	-0.4	0.802	-0.4
133	0.044	-1.0	0.084	-0.1	0.05	-1.9	0.08	-0.7	0.2	-0.4	0.98	0.4
134	0.06	0.0	NA		0.092	-0.2	NA		0.228	0.1	0.831	-0.3
135	0.0536	-0.4	0.0962	0.4	0.0985	0.1	0.0919	-0.2	0.222	0.0	0.829	-0.3
136	0.059	0.0	0.074	-0.6	0.096	0.0	0.093	-0.2	0.154	-1.2	0.711	-0.8
137	0.069	0.6	0.077	-0.5	0.114	0.8	0.103	0.2	0.172	-0.9	0.942	0.2
138	0.048	-0.8	0.079	-0.4	0.071	-1.0	0.081	-0.7	0.238	0.3	0.914	0.1
139	0.106	3.1	0.0844	-0.1	0.106	0.4	0.0875	-0.4	0.255	0.6	0.492	-1.8
140	0.06	0.0	0.08	-0.3	0.102	0.3	0.109	0.5	0.169	-1.0	0.95	0.3
141	0.058	-0.1	0.091	0.2	0.091	-0.2	0.104	0.2	0.25	0.5	2.05	> 5.0
142	0.0594	0.0	0.0753	-0.5	0.0879	-0.3	0.0917	-0.3	0.216	-0.1	0.796	-0.4
143	0.066	0.4	0.092	0.2	0.096	0.0	0.086	-0.5	0.18	-0.8	0.62	-1.2
144	0.064	0.3	0.092	0.2	0.099	0.1	0.099	0.0	0.206	-0.3	0.891	0.0
145	0.0715	0.8	0.0891	0.1	0.144	2.0	0.12	0.9	0.309	1.5	1.02	0.6
146	0.066	0.4	0.103	0.7	0.1	0.2	0.114	0.7	0.246	0.4	0.898	0.0
148	0.062	0.2	0.084	-0.1	0.099	0.1	0.103	0.2	0.234	0.2	1.03	0.6
149	0.064	0.3	0.109	1.0	0.1	0.2	0.103	0.2	0.229	0.1	0.95	0.3
150	0.055	-0.3	0.09	0.1	0.085	-0.4	0.089	-0.4	0.218	-0.1	0.834	-0.3
151	0.059	0.0	0.088	0.0	0.098	0.1	0.093	-0.2	0.209	-0.3	0.973	0.4
152	ND	-4.0	0.078	-0.4	0.095	0.0	0.071	-1.1	0.239	0.3	0.845	-0.2
153	0.054	-0.4	0.084	-0.1	0.085	-0.4	0.09	-0.3	0.23	0.1	1.4	2.3
154	0.0596	0.0	0.0842	-0.1	0.0921	-0.1	0.0916	-0.3	0.204	-0.4	0.99	0.4
155	0.0636	0.3	0.0932	0.3	0.0798	-0.7	0.101	0.1	0.281	1.0	0.971	0.4

APPENDIX 3. Results (mg/kg) and z scores for FFP-RSD (25 %).

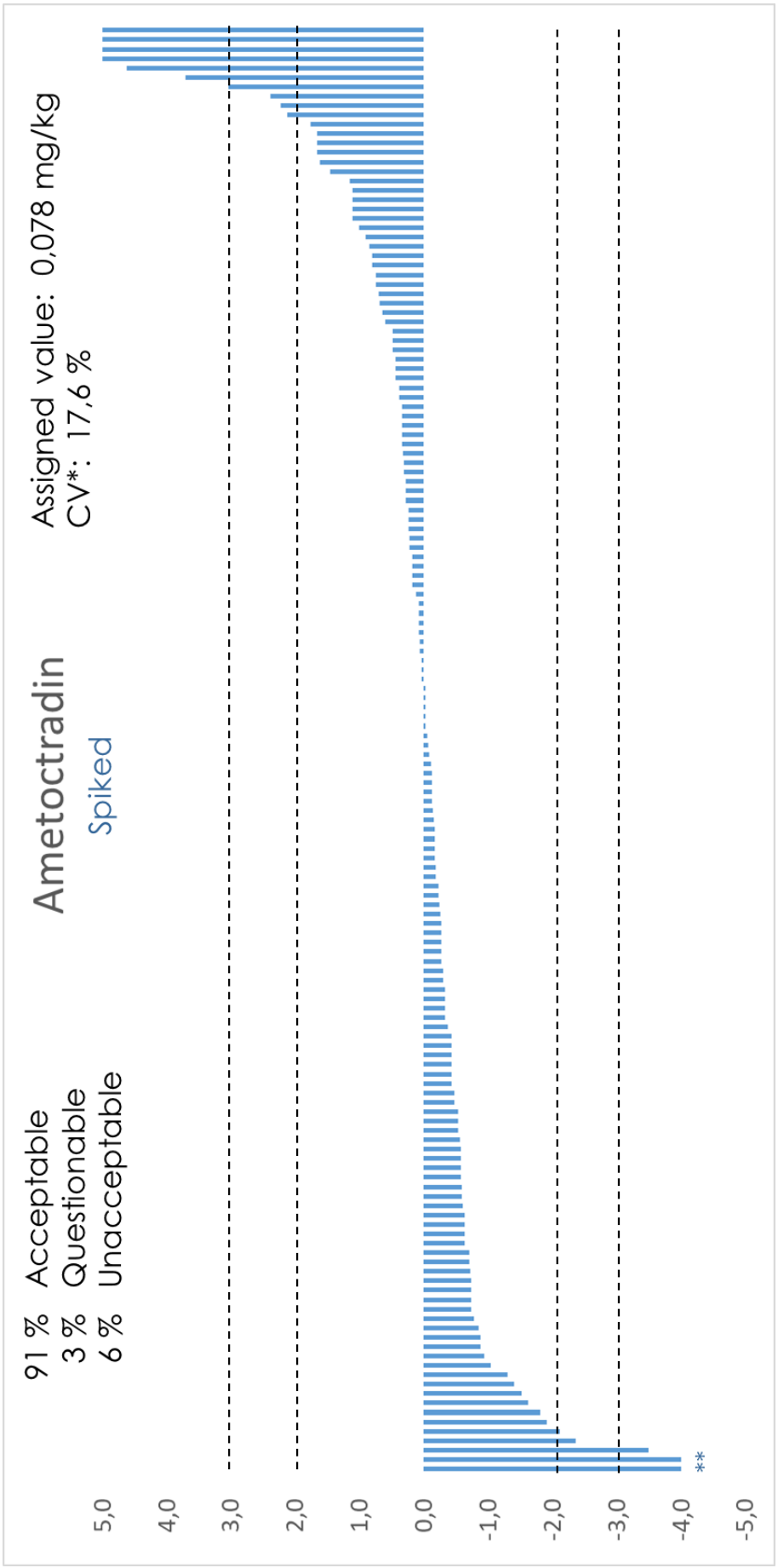
Lab Code	Monocrotophos	z score (FFP-RSD 25 %)	Myclobutanil	z score (FFP-RSD 25 %)	Omethoate	z score (FFP-RSD 25 %)	Pyrimethanil	z score (FFP-RSD 25 %)	Spiroxamine	z score (FFP-RSD 25 %)	Thiabendazole	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.005		0.010		0.003		0.010		0.010		0.010	
Robust mean (mg/kg)	0.0594		0.0869		0.0957		0.0979		0.224		0.890	
156	0.0504	-0.6	0.06918	-0.8	0.0847	-0.5	0.08189	-0.7	0.21242	-0.2	0.68077	-0.9
157	0.0554	-0.3	0.0975	0.5	0.124	1.2	0.0966	-0.1	0.243	0.3	1.25	1.6
158	0.007	-3.5	0.021	-3.0	0.004	-3.8	0.032	-2.7	0.044	-3.2	ND	-4.0
159	0.0585	-0.1	0.0843	-0.1	0.0908	-0.2	0.0902	-0.3	0.214	-0.2	1.1	0.9
160	0.0676	0.6	0.0805	-0.3	0.0911	-0.2	0.12	0.9	0.249	0.5	0.852	-0.2
161	0.0456	-0.9	0.0843	-0.1	ND	-4.0	0.116	0.7	0.228	0.1	1.21	1.4
162	0.07	0.7	0.098	0.5	0.095	0.0	0.111	0.5	0.246	0.4	0.85	-0.2
163	0.054	-0.4	0.068	-0.9	0.083	-0.5	0.087	-0.4	0.19	-0.6	0.73	-0.7
164	0.048	-0.8	0.084	-0.1	0.081	-0.6	0.083	-0.6	0.09	-2.4	0.928	0.2
165	0.1	2.7	0.083	-0.2	0.17	3.1	0.097	0.0	0.27	0.8	1.2	1.4
166	0.009	-3.4	0.096	0.4	0.013	-3.5	0.11	0.5	0.251	0.5	ND	-4.0
167	0.0527	-0.5	0.09	0.1	0.115	0.8	0.103	0.2	0.232	0.1	0.9	0.0
168	NA		0.086	0.0	NA		0.095	-0.1	NA		0.823	-0.3
169	0.062	0.2	0.097	0.5	0.12	1.0	0.106	0.3	0.239	0.3	0.975	0.4
170	0.08	1.4	0.096	0.4	0.102	0.3	0.105	0.3	0.245	0.4	1.1	0.9
171	0.054	-0.4	0.081	-0.3	0.084	-0.5	0.097	0.0	0.241	0.3	0.698	-0.9
172	0.097	2.5	0.073	-0.6	0.079	-0.7	0.087	-0.4	0.166	-1.0	0.512	-1.7
173	0.065	0.4	0.099	0.6	0.104	0.3	0.114	0.7	0.228	0.1	0.999	0.5
174	0.058	-0.1	0.094	0.3	0.115	0.8	0.099	0.0	0.223	0.0	0.829	-0.3
175	0.0643	0.3	0.0802	-0.3	0.089	-0.3	0.0822	-0.6	0.222	0.0	2.57	> 5.0
176	0.0515	-0.5	0.1012	0.7	0.1013	0.2	0.1199	0.9	0.263	0.7	1.0175	0.6
177	0.054	-0.4	0.092	0.2	0.093	-0.1	0.114	0.7	0.249	0.5	0.931	0.2
178	0.059	0.0	0.097	0.5	0.083	-0.5	0.095	-0.1	0.195	-0.5	0.916	0.1
179	NA		0.0868	0.0	0.133	1.6	NA		0.24	0.3	0.902	0.1
180	0.0646	0.3	0.0964	0.4	0.0904	-0.2	0.113	0.6	0.253	0.5	0.672	-1.0
181	0.066	0.4	0.088	0.0	0.118	0.9	0.113	0.6	0.247	0.4	0.788	-0.5
182	NA		0.09	0.1	NA		0.1	0.1	0.25	0.5	NA	
183	0.02	-2.7	0.08	-0.3	0.07	-1.1	0.09	-0.3	0.2	-0.4	0.47	-1.9
184	0.06	0.0	0.096	0.4	0.099	0.1	0.099	0.0	0.26	0.6	0.96	0.3
185	0.0565	-0.2	0.0937	0.3	0.111	0.6	0.104	0.2	0.232	0.1	0.875	-0.1
186	0.064	0.3	0.074	-0.6	NA		ND	-4.0	0.13	-1.7	0.24	-2.9
187	0.0685	0.6	0.0836	-0.2	0.0995	0.2	0.102	0.2	0.266	0.8	0.88	0.0

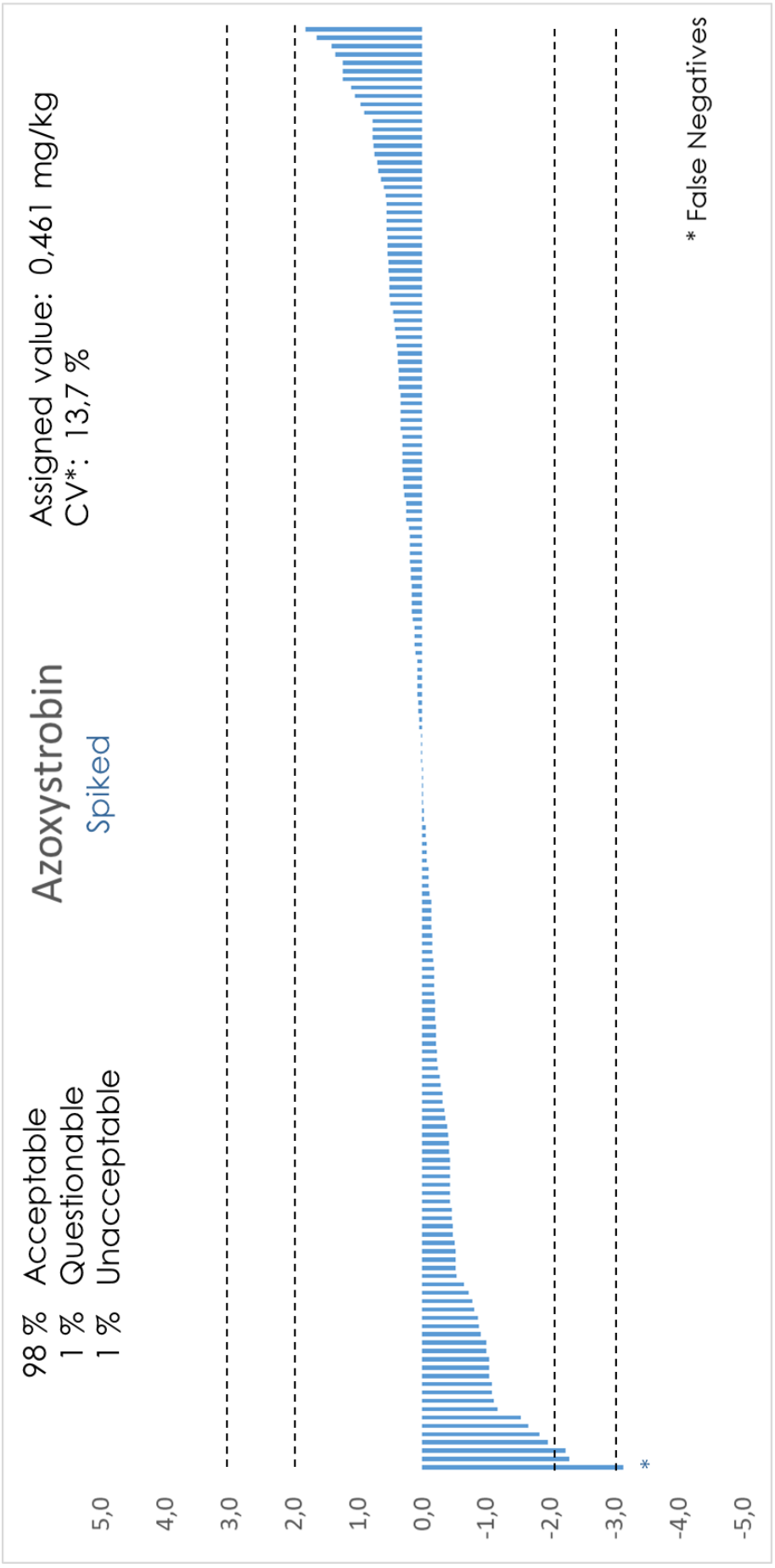
NA: Not analysed ND: Not detected (False negative)

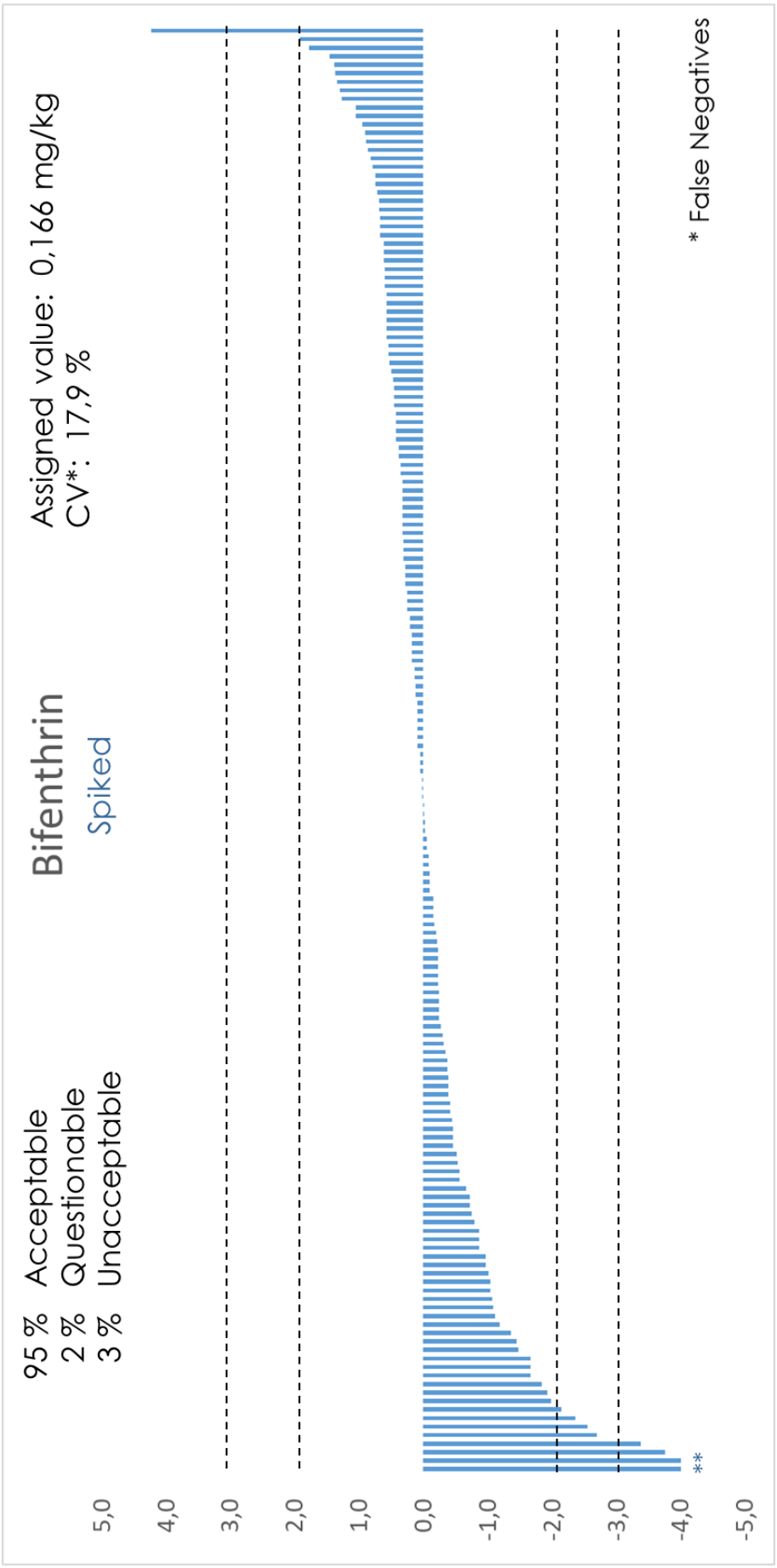
Results reported by the laboratories for the voluntary pesticide novaluron (mg/kg) and its calculated z score value using FFP-RSD 25 %.

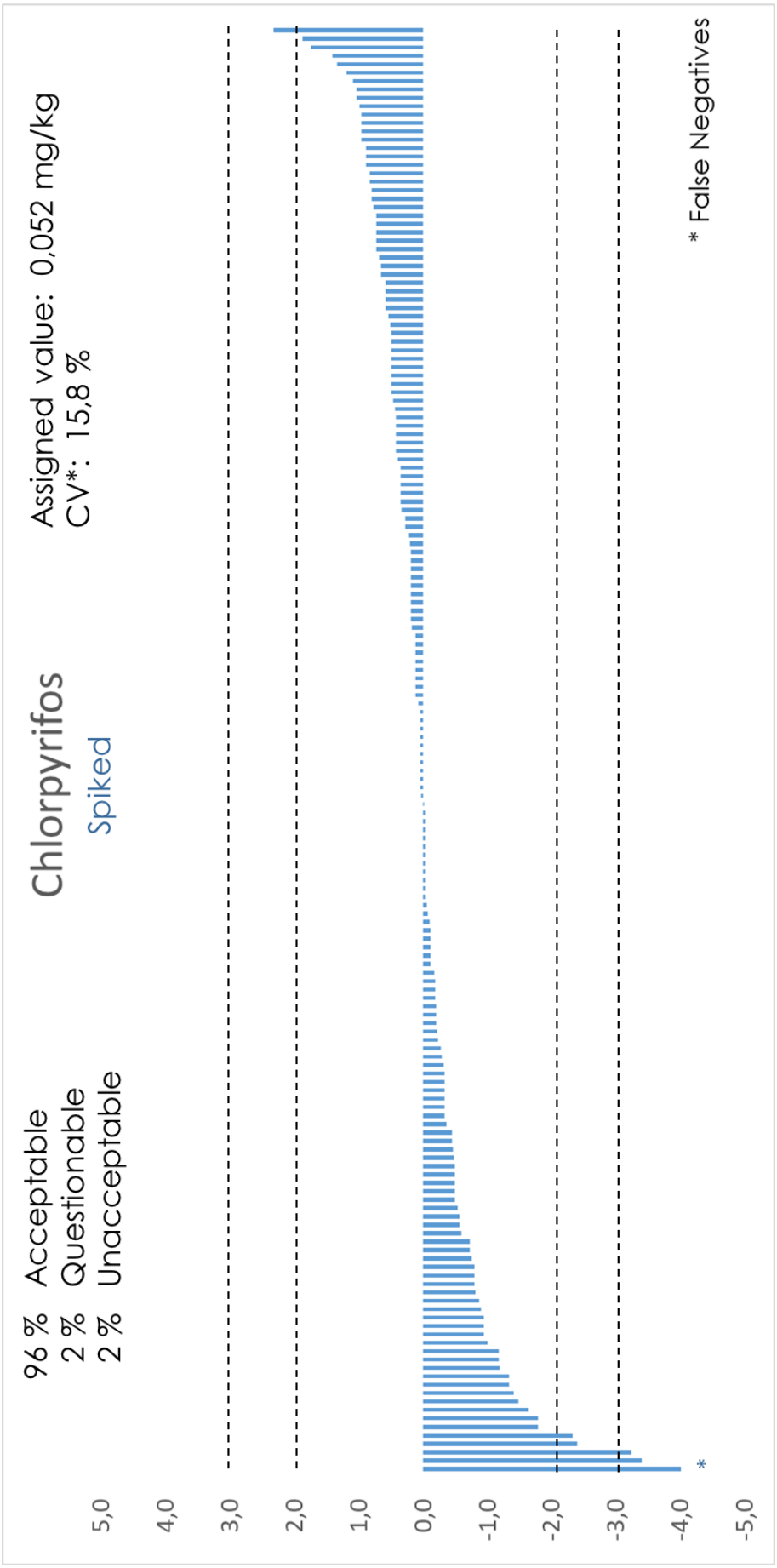
Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Metconazole	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010	
Robust mean (mg/kg)	0.0641		0.0899	
1	NA		0.0808	-0.4
2	0.054	-0.6	0.078	-0.5
3	0.082	1.1	0.107	0.8
4	0.047	-1.1	0.06	-1.3
6	0.102	2.4	0.11	0.9
7	NA		NA	
8	0.056	-0.5	0.086	-0.2
10	0.07	0.4	0.087	-0.1
11	0.06	-0.3	0.097	0.3
12	0.0489	-0.9	0.087	-0.1
13	0.036	-1.8	0.091	0.0
14	0.061	-0.2	0.067	-1.0
15	NA		0.058	-1.4
16	0.05	-0.9	0.089	0.0
17	0.042	-1.4	0.102	0.5
18	0.0628	-0.1	0.0963	0.3
19	0.06	-0.3	0.094	0.2
20	NA		0.073	-0.8
21	NA		NA	
22	0.079	0.9	0.11	0.9
23	NA		0.12	1.3
24	0.0314	-2.0	0.0565	-1.5
25	NA		NA	
26	NA		0.0829	-0.3
27	NA		NA	
28	0.059	-0.3	0.079	-0.5
29	NA		0.3717	12.5
30	0.074	0.6	0.12	1.3
31	0.062	-0.1	0.096	0.3
32	NA		0.091	0.0
33	0.0586	-0.3	0.0982	0.4
34	NA		NA	
35	NA		0.091	0.0
36	NA		0.0763	-0.6
37	NA		0.086	-0.2
38	NA		NA	
39	0.073	0.6	0.069	-0.9
40	0.126	3.9	0.0678	-1.0
41	NA		0.0763	-0.6
42	NA		NA	
43	NA		0.093	0.1
44	0.069	0.3	0.083	-0.3
45	0.07	0.4	0.088	-0.1
46	0.051	-0.8	0.104	0.6
47	NA		0.0938	0.2
48	NA		0.0875	-0.1
49	0.0561	-0.5	0.0752	-0.7
52	NA		0.096	0.3
53	ND	-4.0	0.083	-0.3
54	NA		0.079	-0.5
55	0.071	0.4	0.102	0.5
56	NA		0.096	0.3
57	NA		0.109	0.8
58	NA		0.08	-0.4
59	NA		NA	
60	0.08	1.0	0.0877	-0.1
61	0.08	1.0	0.074	-0.7
62	NA		0.0936	0.2
63	NA		0.095	0.2
65	NA		NA	
66	0.0682	0.3	0.0912	0.1
67	NA		0.081	-0.4
68	ND	-4.0	0.092	0.1
70	NA		0.0839	-0.3
71	0.0635	0.0	0.0851	-0.2
72	NA		0.0951	0.2
74	ND	-4.0	0.094	0.2
75	NA		NA	
76	0.062	-0.1	0.091	0.0
77	NA		0.076	-0.6
78	NA		0.084	-0.3
79	0.04	-1.5	0.065	-1.1
80	NA		ND	-4.0
81	0.062	-0.1	0.0897	0.0
83	0.0793	0.9	0.0922	0.1
84	0.067	0.2	0.083	-0.3
85	0.0701	0.4	0.0854	-0.2
87	NA		0.087	-0.1
88	0.083	1.2	0.111	0.9
89	NA		0.0836	-0.3
90	0.075	0.7	0.09	0.0
91	NA		NA	
92	0.052	-0.8	0.081	-0.4
93	0.0317	-2.0	0.0838	-0.3
94	NA		NA	
95	NA		NA	
96	NA		0.1	0.4
97	NA		NA	
98	0.054	-0.6	0.09	0.0
99	0.072	0.5	0.098	0.4
100	NA		0.0916	0.1
101	NA		0.102	0.5
102	NA		0.114	1.1
103	NA		0.085	-0.2
104	0.0625	-0.1	0.0866	-0.1
105	0.058	-0.4	0.1	0.4
106	NA		NA	
107	NA		0.121	1.4
108	NA		NA	
109	NA		NA	
110	NA		0.067	-1.0
111	NA		NA	
112	NA		0.0805	-0.4
113	NA		0.077	-0.6
114	NA		NA	
115	NA		0.071	-0.8
116	NA		0.091	0.0
117	NA		NA	
118	NA		0.078	-0.5
119	NA		0.077	-0.6
120	NA		0.102	0.5
121	0.081	1.1	0.1	0.4
123	NA		0.0986	0.4
124	0.056	-0.5	0.088	-0.1
125	NA		NA	
126	NA		NA	
127	NA		0.1	0.4
128	0.044	-1.3	0.09	0.0
129	0.054	-0.6	0.082	-0.4
130	NA		NA	
131	ND	-4.0	0.077	-0.6
133	NA		0.077	-0.6
134	NA		NA	
135	0.0528	-0.7	0.0888	0.0
136	NA		0.085	-0.2
137	NA		NA	
138	0.068	0.2	0.097	0.3
139	0.0463	-1.1	0.0853	-0.2
140	NA		NA	
141	NA		0.089	0.0
142	0.082	1.1	0.0944	0.2
143	NA		0.072	-0.8
144	NA		0.1	0.4
145	NA		0.0957	0.3
146	NA		NA	
148	0.075	0.7	0.101	0.5
149	NA		0.098	0.4
150	NA		NA	
151	0.069	0.3	0.118	1.2
152	0.066	0.1	0.099	0.4
153	0.083	1.2	0.085	-0.2
154	NA		0.0867	-0.1
155	0.0696	0.3	0.0916	0.1
156	0.04263	-1.3	0.08116	-0.4
157	0.0523	-0.7	0.0899	0.0
158	NA		NA	
159	NA		0.0817	-0.4
160	NA		0.0966	0.3
161	NA		0.093	0.1
162	NA		0.107	0.8
163	NA		NA	
164	NA		0.091	0.0
165	NA		0.12	1.3
166	NA		NA	
167	NA		0.0982	0.4
168	NA		NA	
169	0.064	0.0	0.088	-0.1
170	NA		0.096	0.3
171	NA		NA	
172	NA		0.056	-1.5
173	0.058	-0.4	0.106	0.7
174	0.116	3.2	0.096	0.3
175	NA		NA	
176	NA		0.1088	0.8
177	NA		0.096	0.3
178	NA		0.084	-0.3
179	NA		0.0957	0.3
180	NA		0.0822	-0.3
181	NA		0.084	-0.3
182	NA		NA	
183	NA		0.09	0.0
184	NA		NA	
185	NA		NA	
186	NA		0.07	-0.9
187	NA		NA	

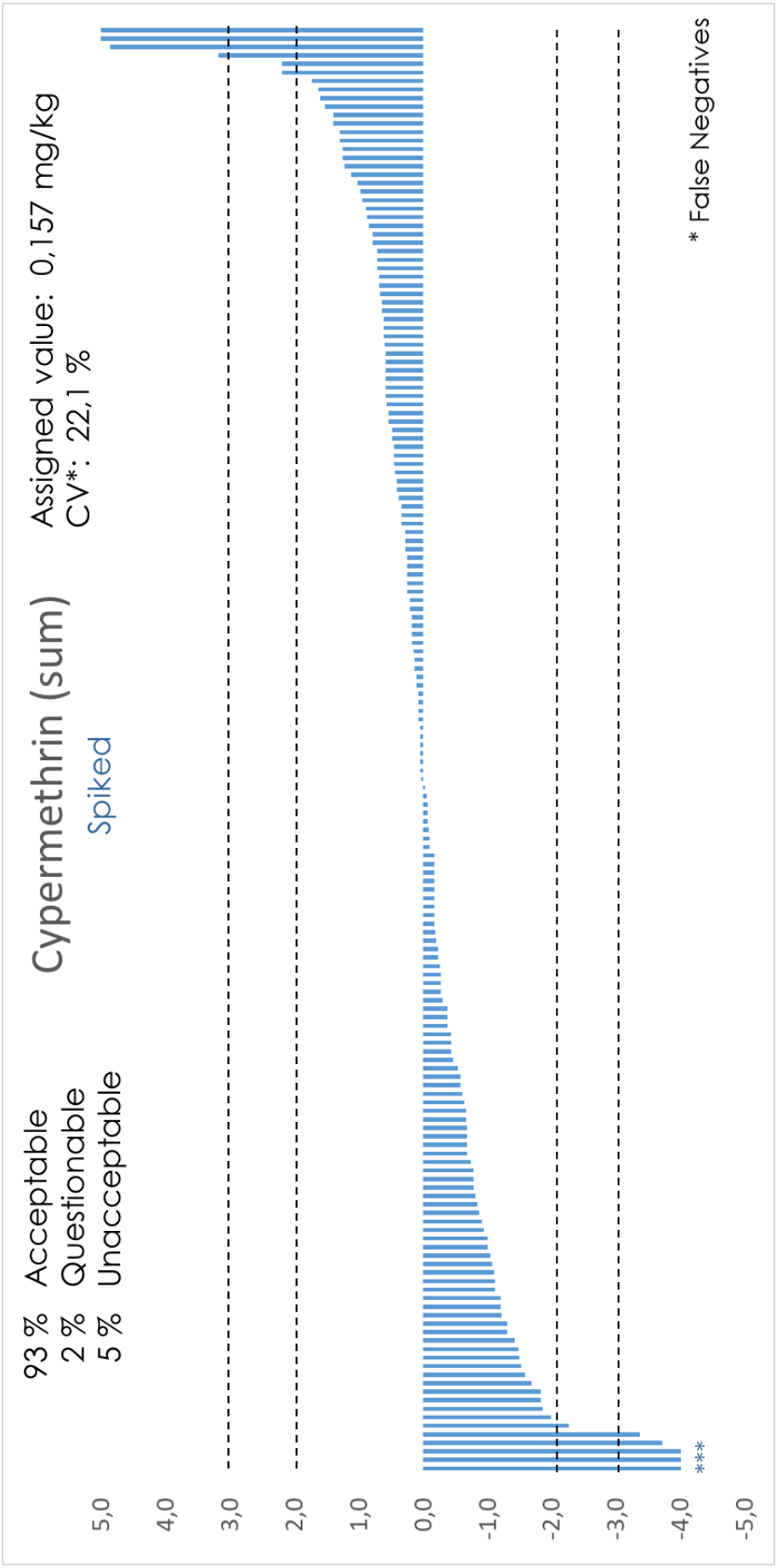
NA: Not analysed ND: Not detected (False negative)

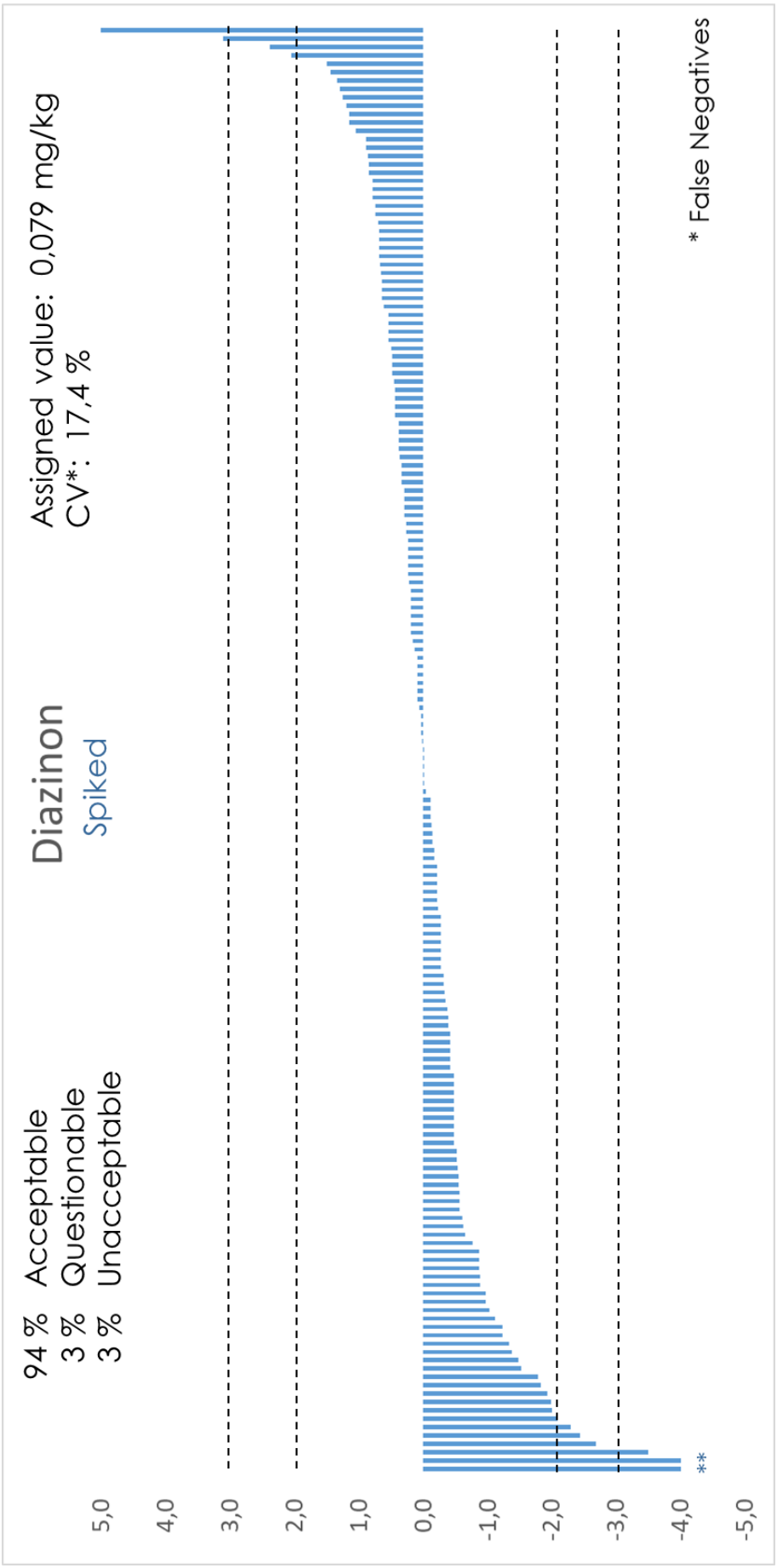

Assigned value: 0,078 mg/kg
CV*: 17,6 %
Ametoctradin
Spiked
91 % Acceptable
3 % Questionable
6 % Unacceptable
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
**

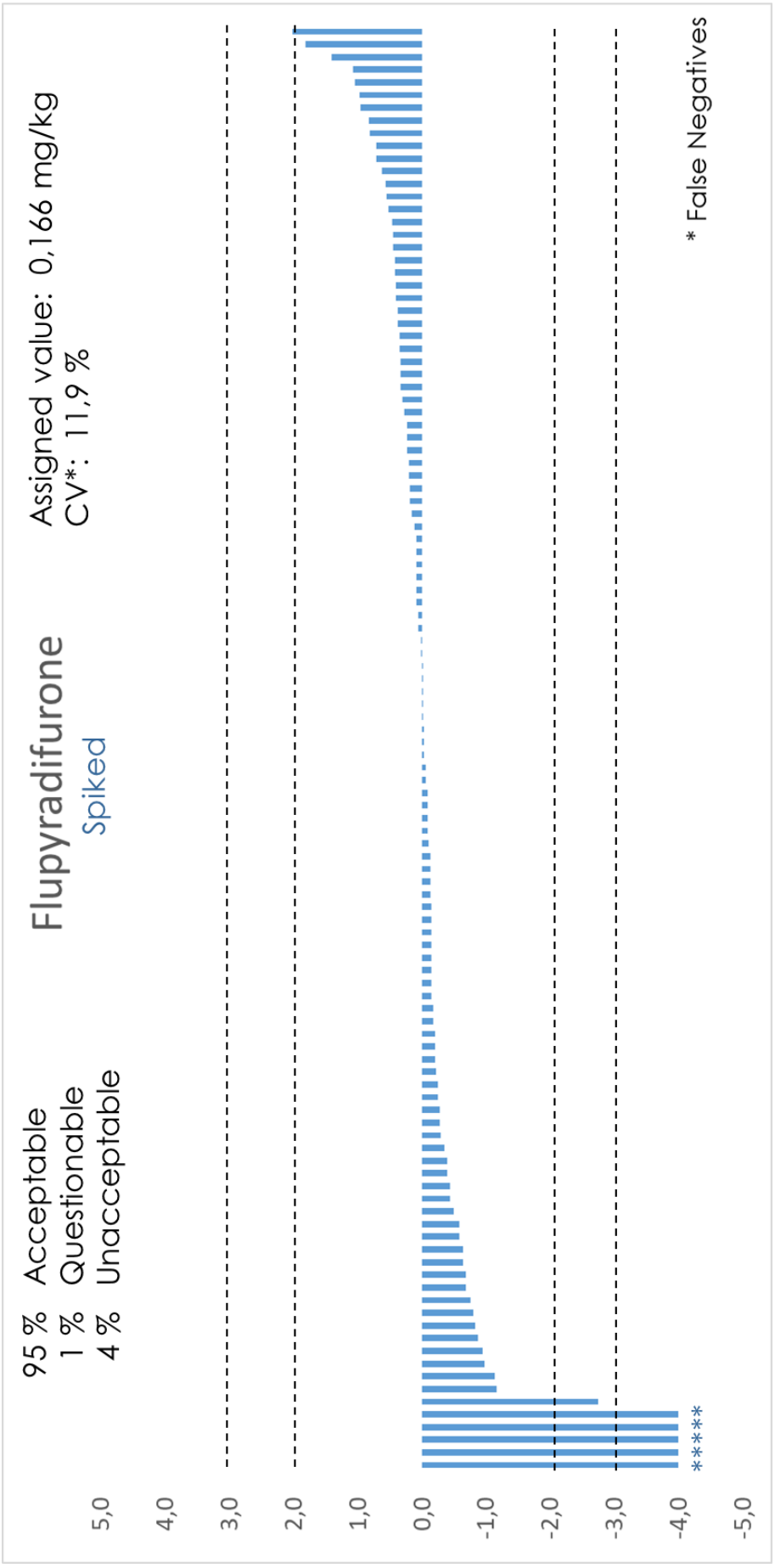

98 % Acceptable
1 % Questionable
1 % Unacceptable
Azoxystrobin
Spiked
Assigned value: 0,461 mg/kg
CV*: 13,7 %
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*

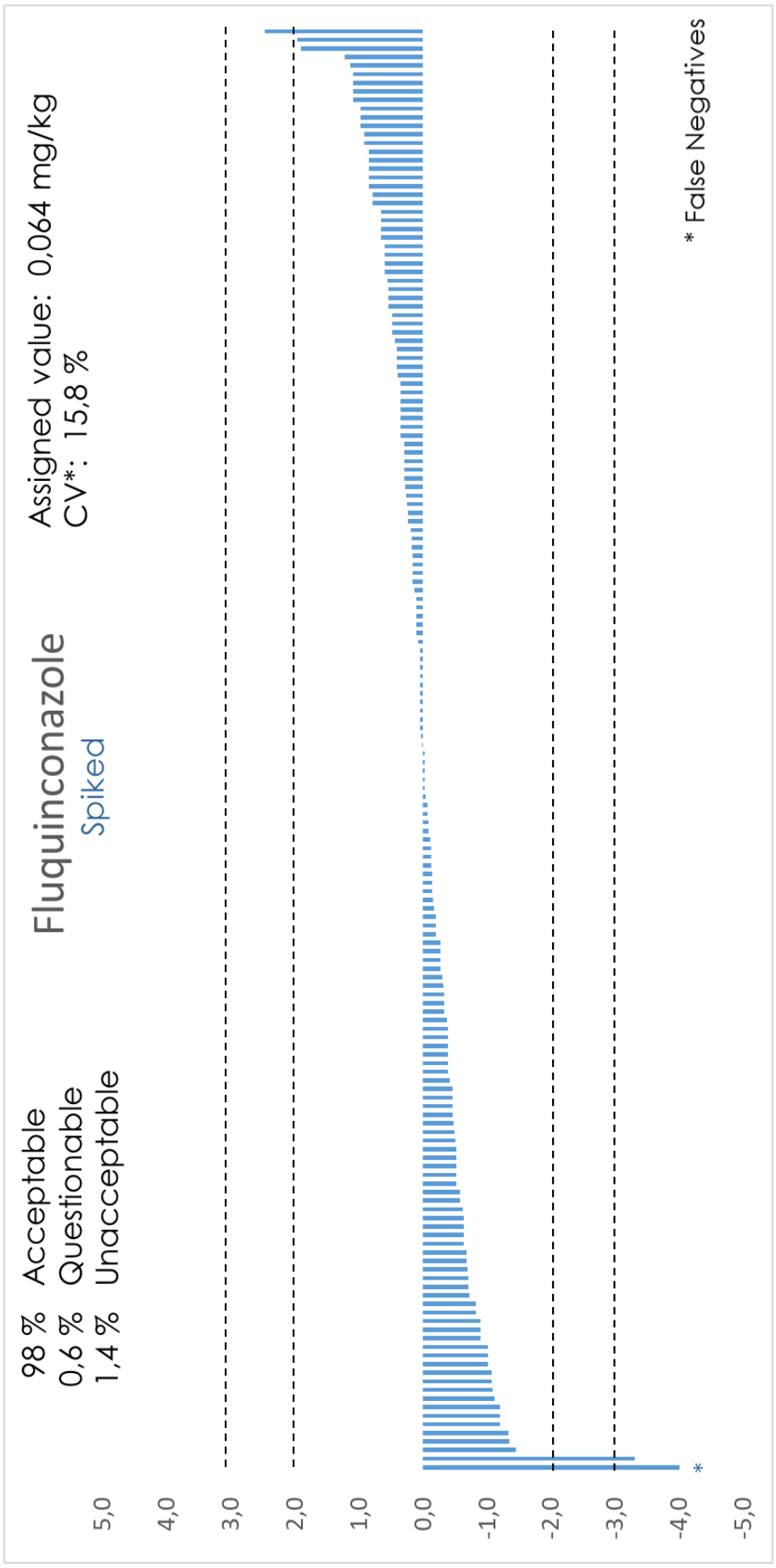

Assigned value: 0,166 mg/kg
CV*: 17,9 %
Bifenthrin
Spiked
95 % Acceptable
2 % Questionable
3 % Unacceptable
* False Negatives
**
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0

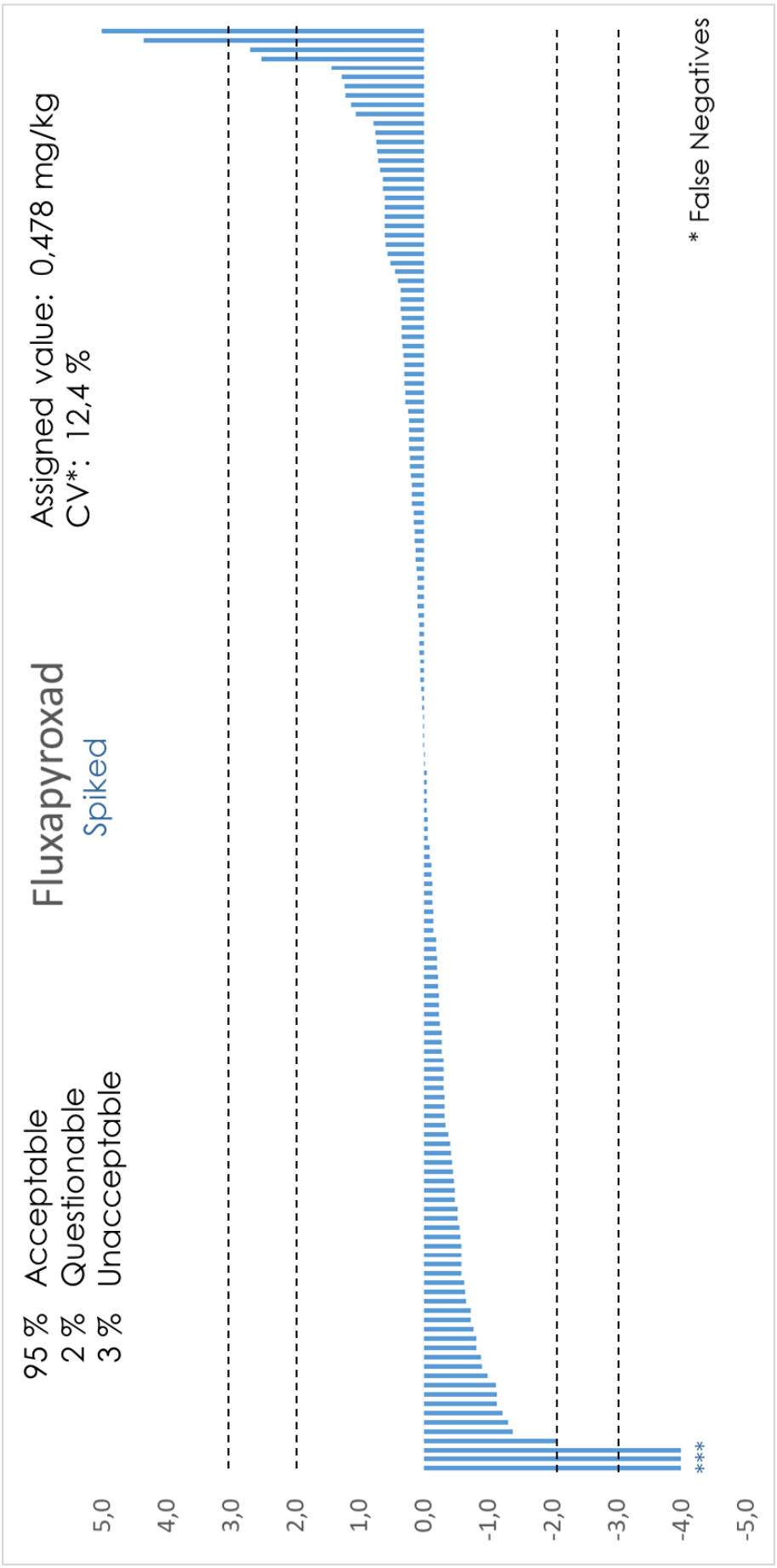

96 % Acceptable
2 % Questionable
2 % Unacceptable
Chlorpyrifos
Spiked
Assigned value: 0,052 mg/kg
CV*: 15,8 %
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*

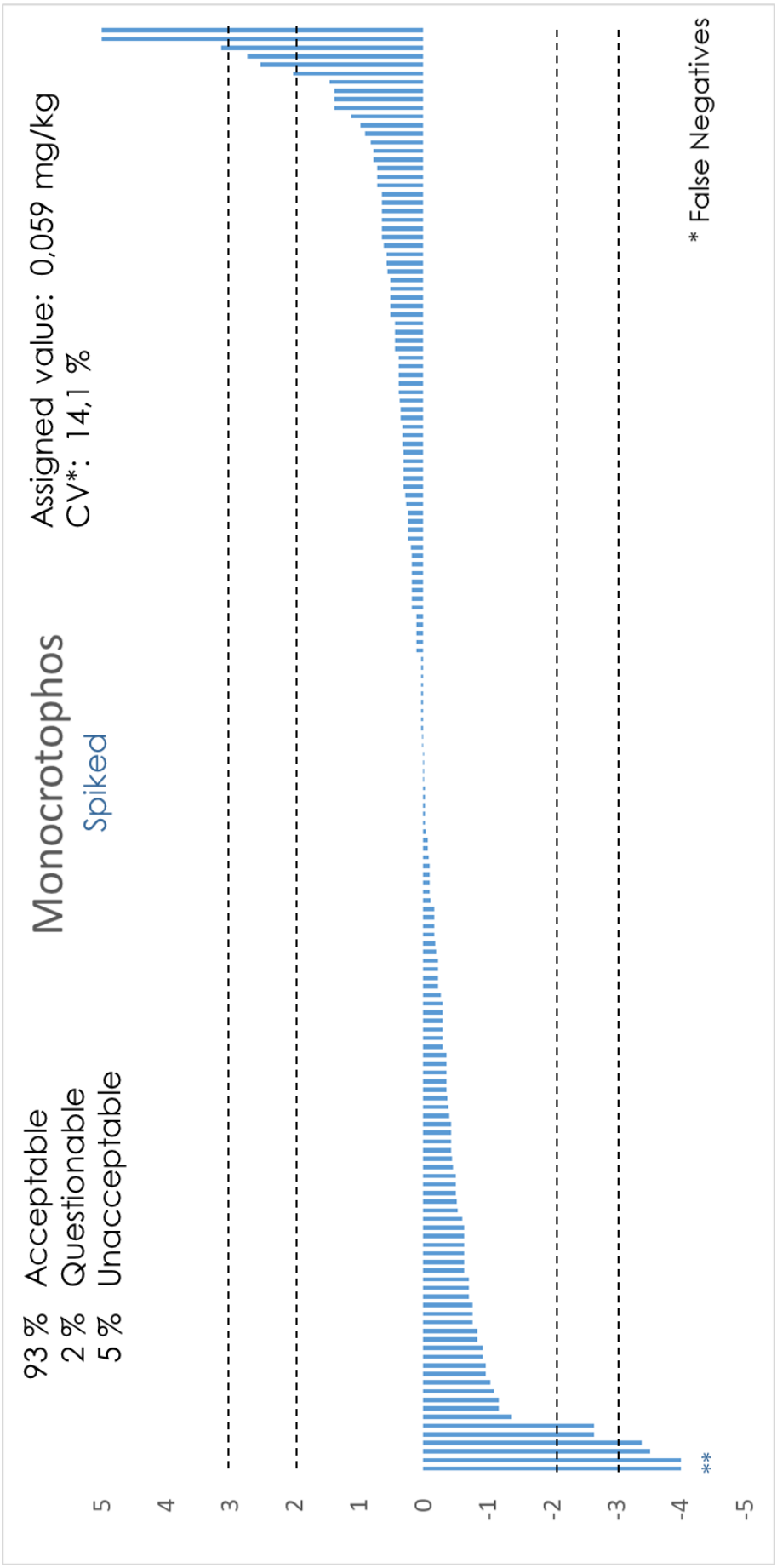

Cypermethrin (sum)
Spiked
Assigned value: 0,157 mg/kg
CV*: 22,1 %
93 % Acceptable
2 % Questionable
5 % Unacceptable
* False Negatives
***
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0

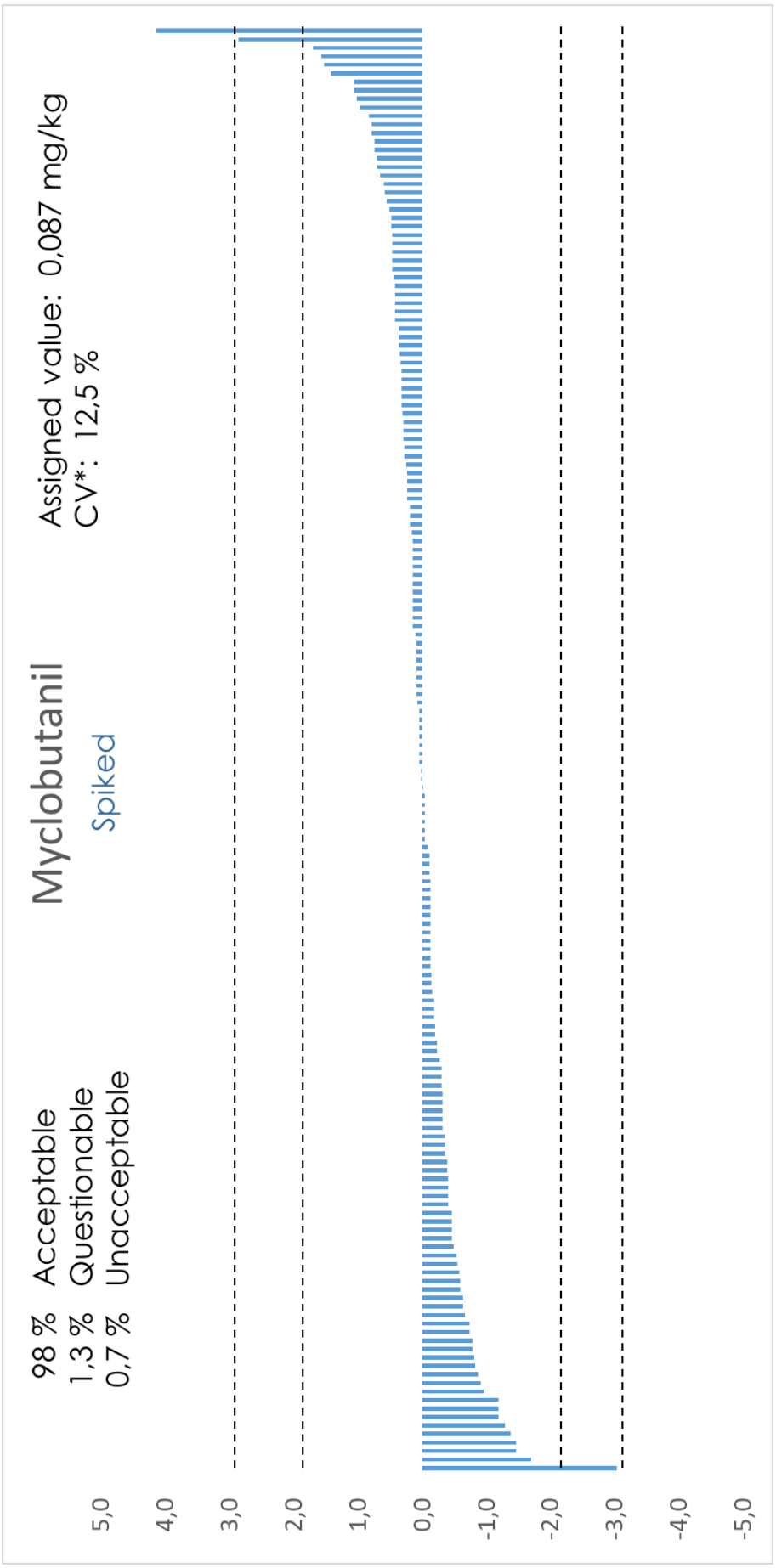

Diazinon
Spiked
Assigned value: 0,079 mg/kg
CV*: 17,4 %
94 % Acceptable
3 % Questionable
3 % Unacceptable
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
**

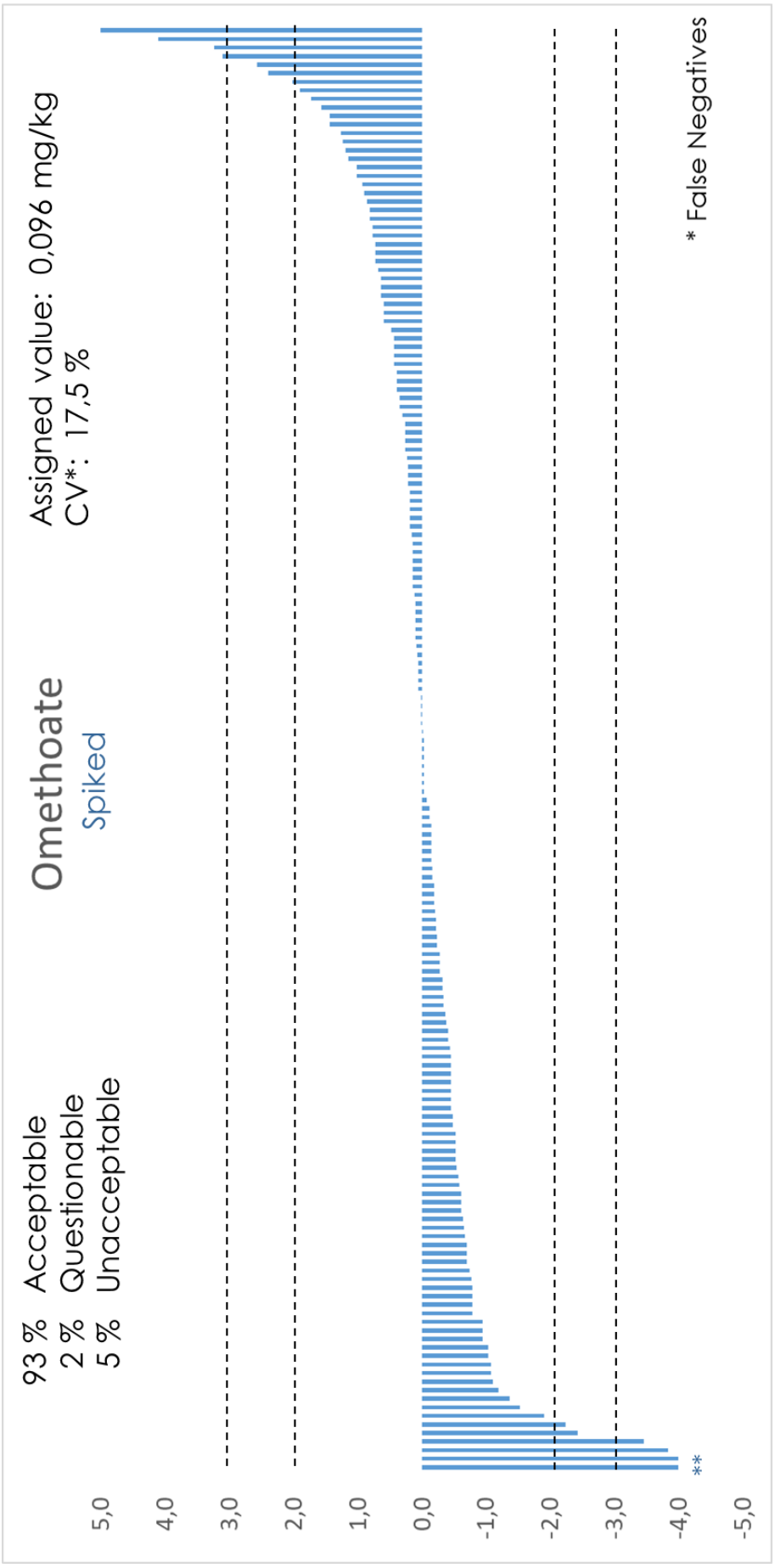

95 % Acceptable
1 % Questionable
4 % Unacceptable
Flupyradifurone
Spiked
Assigned value: 0,166 mg/kg
CV*: 11,9 %
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*****

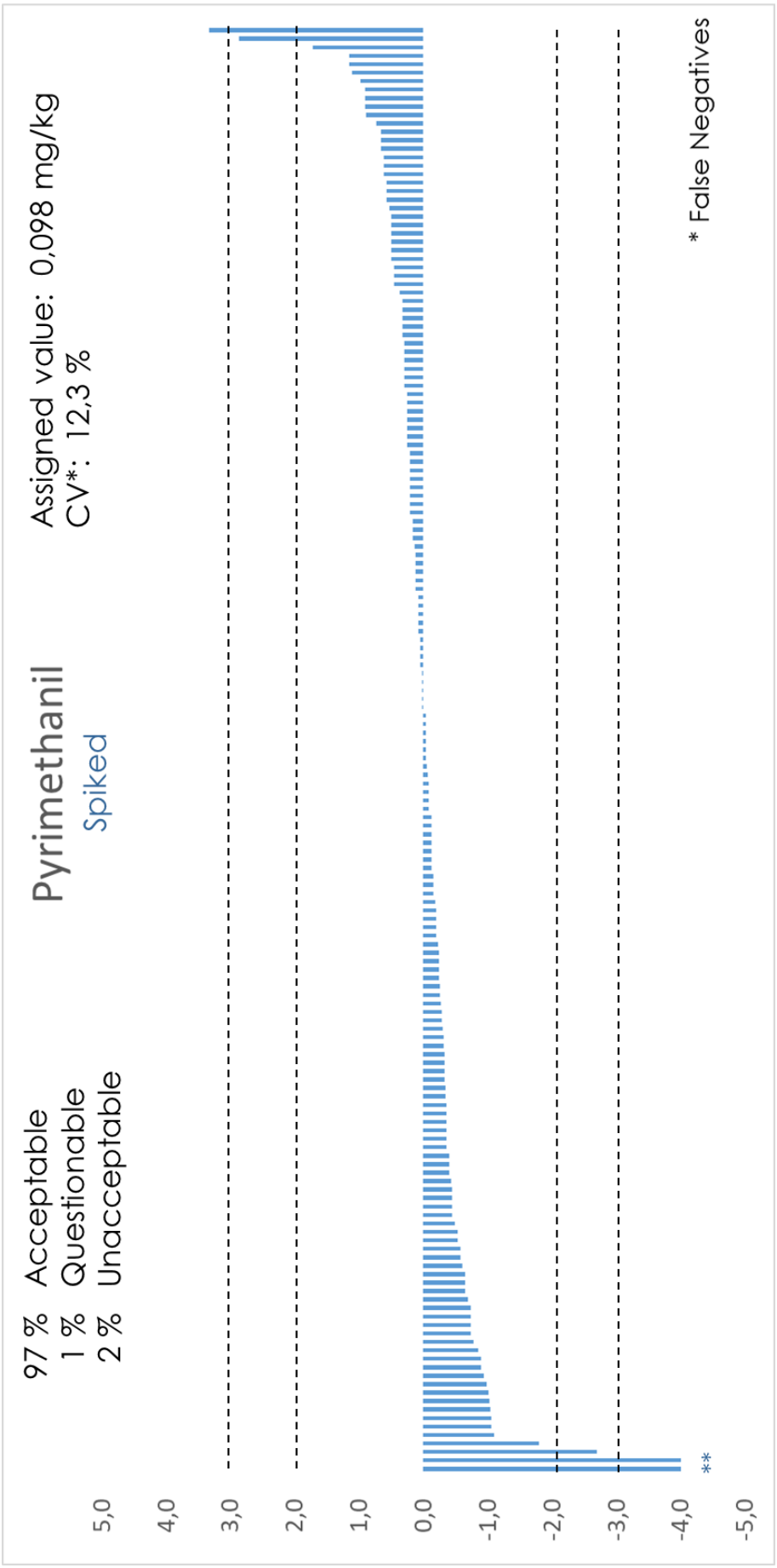

Fluquinconazole
Spiked
Assigned value: 0,064 mg/kg
CV*: 15,8 %
98 % Acceptable
0,6 % Questionable
1,4 % Unacceptable
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*

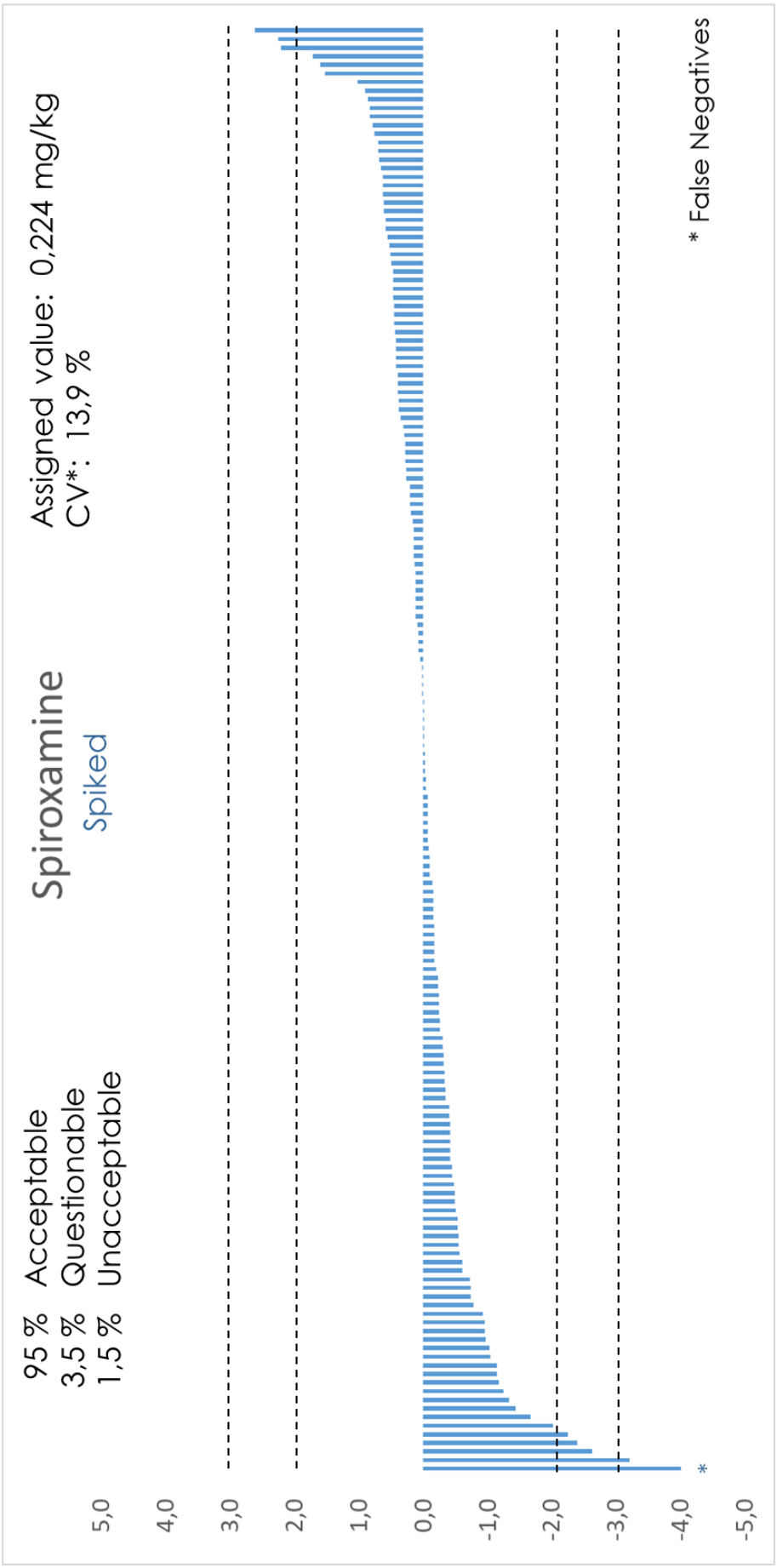

Fluxapyroxad
Spiked
Assigned value: 0,478 mg/kg
CV*: 12,4 %
95 % Acceptable
2 % Questionable
3 % Unacceptable
* False Negatives
***
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0

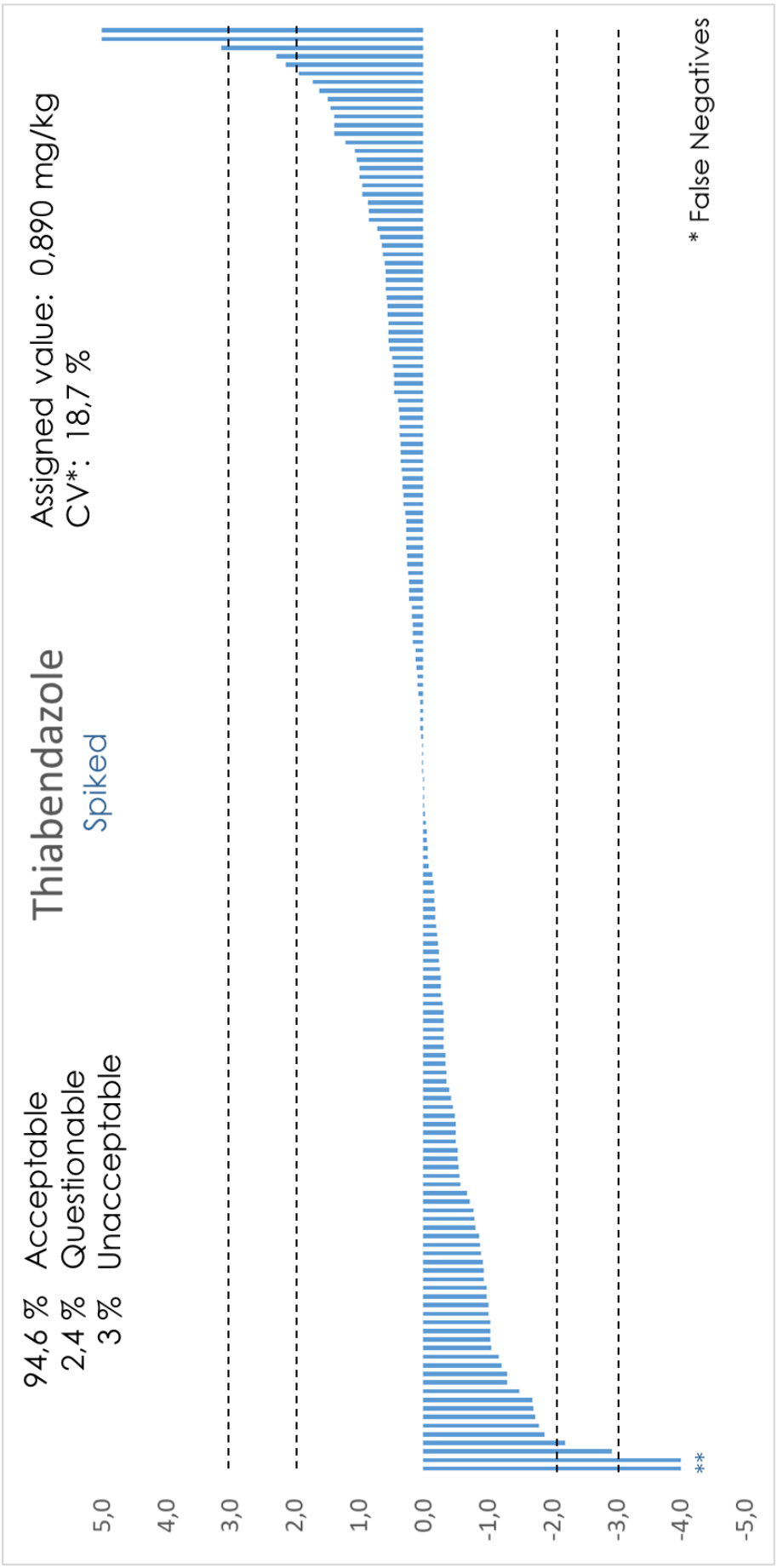

93 % Acceptable
2 % Questionable
5 % Unacceptable
Monocrotophos
Spiked
Assigned value: 0,059 mg/kg
CV*: 14,1 %
* False Negatives
**
5
4
3
2
1
0
-1
-2
-3
-4
-5

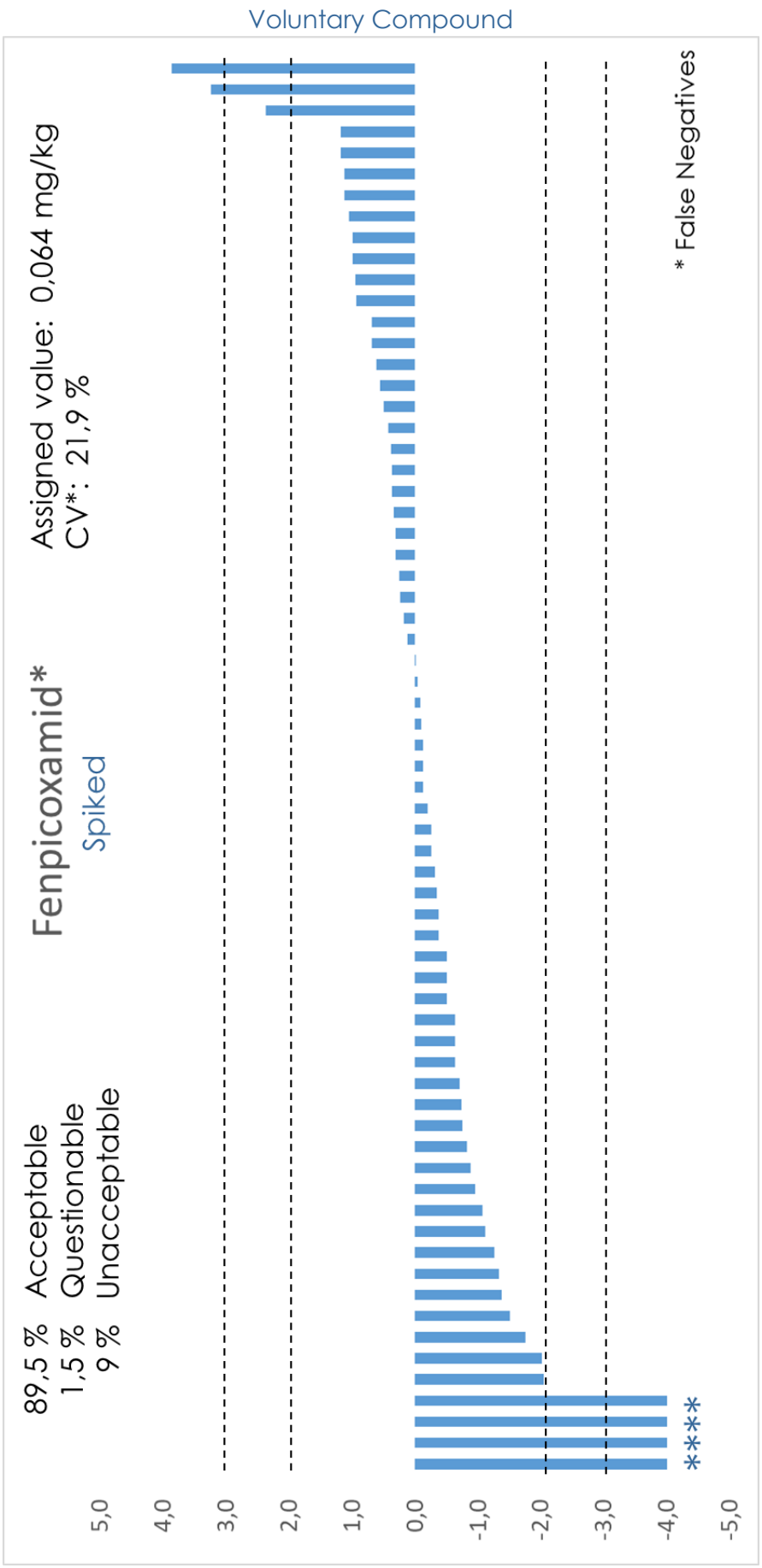

Myclobutanil
Spiked
Assigned value: 0,087 mg/kg
CV*: 12,5 %
98 % Acceptable
1,3 % Questionable
0,7 % Unacceptable
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0

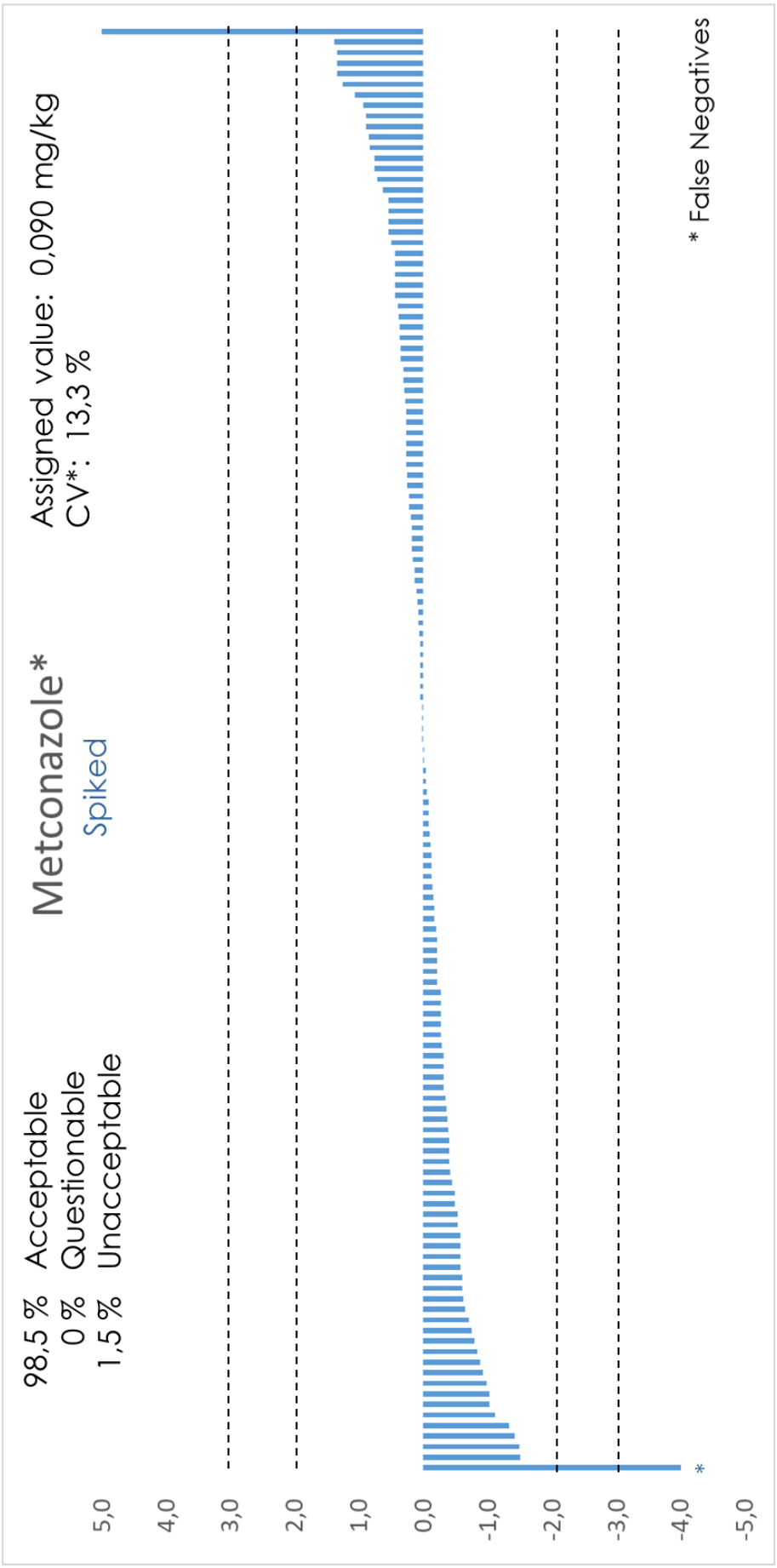

Omethoate
Spiked
Assigned value: 0,096 mg/kg
CV*: 17,5 %
93 % Acceptable
2 % Questionable
5 % Unacceptable
* False Negatives
**
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0


97 % Acceptable
1 % Questionable
2 % Unacceptable
Pyrimethanil
Spiked
Assigned value: 0,098 mg/kg
CV*: 12,3 %
* False Negatives
**
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0


Spiroxamine
Spiked
Assigned value: 0,224 mg/kg
CV*: 13,9 %
95 % Acceptable
3,5 % Questionable
1,5 % Unacceptable
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*


Thiabendazole
Spiked
Assigned value: 0,890 mg/kg
CV*: 18,7 %
94,6 % Acceptable
2,4 % Questionable
3 % Unacceptable
* False Negatives
**
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0


Voluntary Compound
Fenpicoxamid*
Spiked
Assigned value: 0,064 mg/kg
CV*: 21,9 %
89,5 % Acceptable
1,5 % Questionable
9 % Unacceptable
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
****


98,5 % Acceptable
0 % Questionable
1,5 % Unacceptable
Metconazole*
Spiked
Assigned value: 0,090 mg/kg
CV*: 13,3 %
* False Negatives
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-4,0
-5,0
*

APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

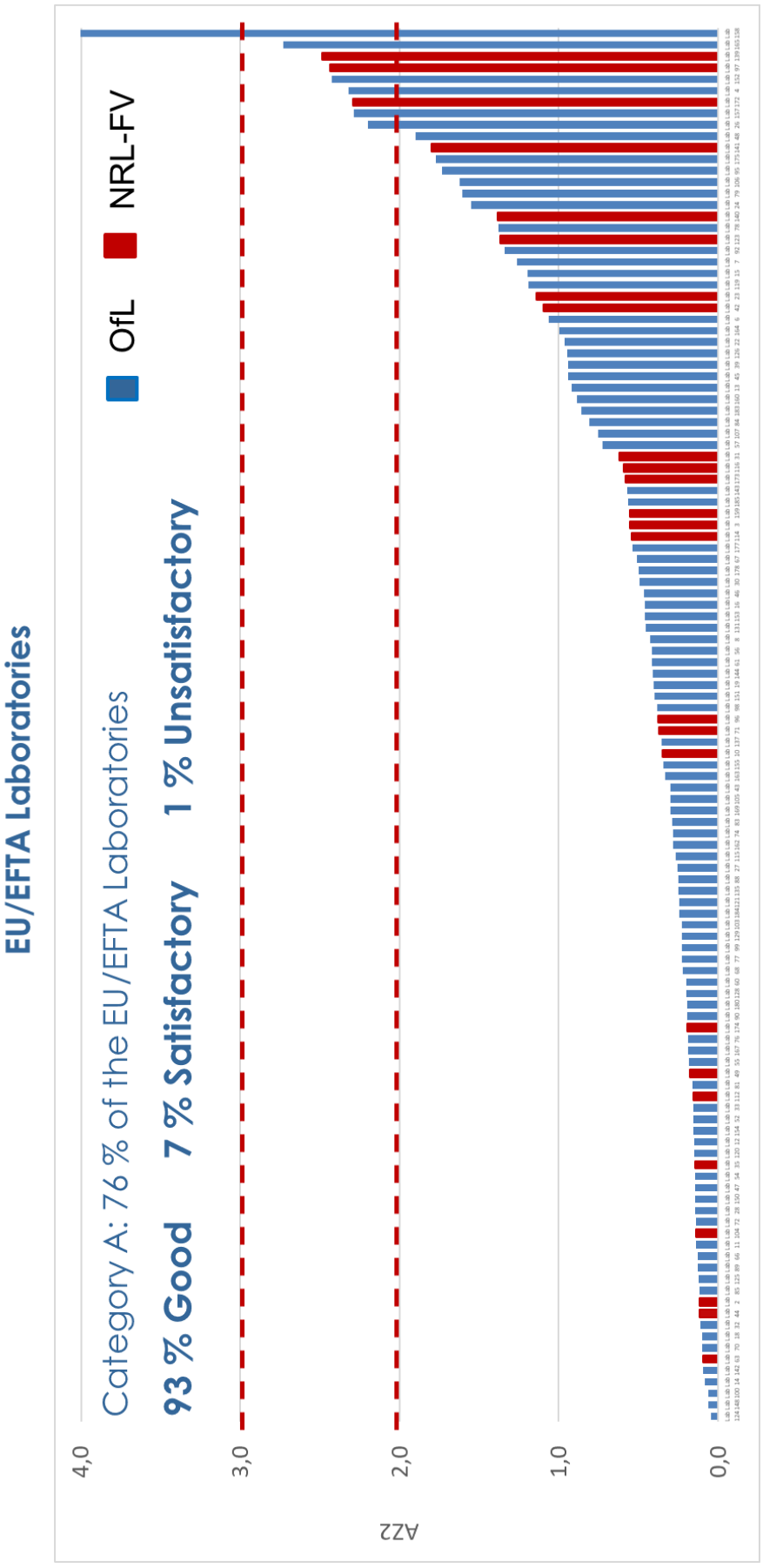
Laboratory Code	Ametoctradin	Azoxystrobin	Bifenthrin	Chlorpyrifos	Cypermethrin (sum)	Diazinon	Flupyradifurone	Fluquinconazole	Fluxapyroxad	Monocrotophos	Myclobutanil	Omethoate	Pyrimethanil	Spiroxamine	Thiabendazole	No. of detected pesticides	AZ^2
	z score																
1	-0.6	0.0	-0.5	-0.8	-0.3	-0.3	0.3	0.0	0.0	0.1	-0.1	-0.2	-0.2	-0.2	-0.3	15	0.1
2	-0.1	-0.4	0.2	0.0	0.2	-0.2	0.0	-0.7	-0.6	0.2	-0.1	0.1	0.2	-0.2	0.6	15	0.1
3	0.3	-0.2	0.7	0.4	0.7	0.3	0.5	0.7	1.2	-0.2	0.8	1.3	0.2	0.6	1.4	15	0.6
4	-0.7	-2.3	-1.7	-1.8	-1.2	-2.0	-0.6	-0.8	-0.6	-1.0	-1.5	3.2	-1.0	-0.7	-1.0	15	2.3
6	1.6	0.3	0.5	0.4	0.2	1.3	0.0	0.4	0.2	0.0	0.4	-0.4	0.3	2.6	1.9	15	1.1
7	-4.0	0.3	0.2	0.0	-0.1	-0.2		-0.1	0.1	-0.8	0.3	-0.8	0.2	0.0	-0.2	13	1.3
8	-0.4	-0.1	0.0	-0.5	-0.6	0.2	-0.6	-1.0	-0.6	1.0	-0.4	0.7	0.6	0.9	-1.0	15	0.4
10	0.3	-0.2	0.7	0.5	0.7	1.1	0.4	0.3	0.3	-0.7	0.7	-0.3	-0.2	0.1	-1.0	15	0.3
11	0.1	-0.1	0.3	0.7	-0.7	0.4	-0.2	0.0	-0.5	0.4	0.0	0.4	-0.1	-0.2	-0.3	15	0.1
12	0.1	-0.1	0.5	0.2	-0.2	0.7	-0.7	0.1	0.2	0.1	0.8	-0.4	-0.1	0.4	-0.2	15	0.2
13	-0.7	-0.4	-0.5	0.8	-0.7	-1.3	0.0	-1.0	-0.8	-0.1	0.0	1.7	0.5	2.3	0.3	15	0.9
14	-0.6	0.2	0.0	-0.1	0.1	0.0	0.2	-0.4	0.0	0.6	0.0	-0.1	-0.4	0.0	0.4	15	0.1
15	0.5	-0.5	-2.4	-1.6	-1.9	-0.4		-0.4	-0.6	-1.2	0.1	-1.2	0.0	-1.0	-0.3	14	1.2
16	-0.7	0.1	-0.5	-0.7	-0.4	0.0	-0.8	-1.2	-0.5	1.1	-1.0	-0.6	0.2	-0.5	-0.5	15	0.5
18	0.4	-0.1	0.2	0.2	0.3	0.7	0.4	-0.3	-0.3	0.2	0.2	-0.3	0.2	0.1	-0.4	15	0.1
19	0.2	1.0	0.4	0.4	0.1	1.4	0.7	0.9	-0.3	-0.8	0.3	0.3	0.5	0.0	-0.5	15	0.4
22	1.1	0.6	1.1	0.9	1.6	0.9	0.8	0.4	0.3	0.8	1.5	0.6	0.9	0.8	1.4	15	1.0
23	0.0	-0.7	-2.1	-1.2	-0.6	-1.1	0.5	-1.1	-0.9	0.0	-1.2	-0.6	-1.1	-1.4	-1.3	15	1.1
24	-1.6	-2.0	-1.0	-0.5	-1.0	-0.9	-1.2	-1.4	-1.1	-0.4	-1.3	-1.1	-1.0	-2.0	-1.1	15	1.6
26	5.0	-1.0	0.2	-0.2	-1.8	-0.6	-0.1	0.8	0.0	0.0	-0.4	0.2	-0.4	-1.3	-0.5	15	2.2
27	0.0	0.2	0.3	1.4	0.6	0.7		0.3	0.2	0.2	0.0	0.2	-0.1	0.5	0.4	14	0.3
28	0.4	-0.2	-0.2	0.1	0.6	0.8	0.3	0.2	-0.3	-0.2	0.1	-0.4	-0.4	0.0	-0.5	15	0.1
30	1.2	-0.5	-0.4	0.0	0.6	0.1	0.4	1.1	-0.2	-0.2	1.4	-0.5	-0.5	0.6	-0.9	15	0.5
31	0.6	0.5	1.8	-0.3	0.1	-0.9	-0.1	0.4	0.6	-0.7	0.8	-0.8	0.1	-0.3	1.5	15	0.6
32	-0.5	0.1	-0.6	0.9	0.3	-0.1	0.0	0.0	-0.2	0.0	0.1	-0.2	-0.2	-0.2	-0.2	15	0.1
33	0.6	-0.1	0.4	0.8	-0.1	0.5	-0.2	-0.1	0.0	0.4	0.3	0.1	0.1	0.6	0.3	15	0.2
35	-0.3	0.4	-0.1	0.5	-0.4	0.3		1.1	0.0	0.0	0.1	0.2	0.3	-0.1	0.1	14	0.1
37	3.7	-0.1	0.7	-0.8	1.2	-2.3	0.0	-0.9	-0.4	-0.6	0.1	-0.4	-0.1	-0.6	0.0	15	1.6
39	-0.3	0.6	0.1	-0.3	-0.5	-1.0	-0.3	-0.6	1.2	0.6	-0.5	-0.2	0.0	0.3	3.1	15	0.9
41	-0.7	-0.3	0.3	-0.2	0.7	-0.1	-0.9	-0.6	-0.7	-0.5	-0.6	-0.6	-0.2	-0.4	0.0	15	0.3
42	-0.6	0.3	-1.9	-1.3	-1.8	-1.4		1.0	0.3	0.3	-0.5	-0.6	-1.1	-1.0	-0.1	14	1.1
43	-0.2	0.6	0.6	0.2	1.1	0.2		1.1	0.6	-0.3	0.0	0.6	0.3	0.0	-0.2	14	0.3
44	-0.2	0.2	0.0	0.1	0.1	0.2	0.2	-0.3	0.2	0.6	0.3	0.7	0.1	0.4	0.6	15	0.1
45	-2.4	0.1	0.5	0.1	-0.1	0.4		-0.6	0.1	0.0	0.1	1.9	0.1	0.1	-1.7	14	0.9
46	-0.6	0.3	-0.8	-0.7	-0.9	-0.5	-0.3	-0.5	0.6	1.5	-0.4	0.0	1.1	0.0	0.5	15	0.5
47	0.2	-0.2	0.3	-0.3	-0.2	-0.4	-0.8	0.3	-0.5	-0.1	0.0	-0.4	-0.8	0.1	-0.3	15	0.1
48	-0.1	0.0	4.2	-0.1	3.2	0.1	0.0	-0.2	-0.1	0.3	0.4	-0.2	0.0	0.1	0.3	15	1.9
49	-0.7	-0.4	-0.2	0.2	-0.7	-0.5	-0.2	-0.4	-0.6	-0.4	-0.2	0.4	-0.1	-0.4	-0.1	15	0.2
52	-0.1	0.2	-0.6	0.0	-0.8	0.6	0.4	-0.3	0.4	-0.5	0.3	0.2	0.3	0.2	0.2	15	0.2
53	0.7	0.4	0.3	0.5	0.1	0.6	0.4	0.3	0.7	0.5	0.3	0.4	-0.4	-0.4	0.6	15	0.2
54	0.4	0.2	-0.2	0.0	-0.2	-0.5	-0.4	-0.6	0.1	-0.2	-0.7	0.1	-0.6	0.4	0.1	15	0.1
55	0.4	0.3	-0.4	0.8	0.1	0.5	0.3	0.0	-0.1	-0.2	0.3	-0.4	0.1	0.6	0.9	15	0.2
56	-0.3	0.5	0.9	0.1	1.0	-1.5		-0.1	0.3	-0.1	0.0	0.4	0.5	0.8	-0.5	14	0.4
57	0.9	1.3	0.5	1.0	0.6	0.7	0.7	0.5		0.8	0.7	0.9	1.0	0.9	1.0	14	0.7
60	-0.3	0.5	0.4	0.5	0.8	0.7	-0.1	0.0	-0.1	-0.1	0.3	0.8	0.3	0.5	0.0	15	0.2
61	-0.7	1.2	-0.1	-0.1	-0.4	-0.2	-0.2	0.8	-0.2	0.5	1.1	0.5	0.2	0.7	1.0	15	0.4
62	0.2	0.3	0.6	0.5	0.5	0.5		0.4	0.1	0.6	0.5	0.1	-0.2	0.6	0.9	14	0.2

APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

Laboratory Code	Ametoctradin	Azoxystrobin	Bifenthrin	Chlorpyrifos	Cypermethrin (sum)	Diazinon	Flupyradifurone	Fluquinconazole	Fluxapyroxad	Monocrotophos	Myclobutanil	Omethoate	Pyrimethanil	Spiroxamine	Thiabendazole	No. of detected pesticides	AZ^2
	z score																
63	-0.4	0.1	0.4	0.1	0.6	0.3	0.2	0.0	0.2	-0.3	0.1	0.0	0.3	-0.5	0.2	15	0.1
66	-0.1	0.5	0.7	0.4	0.4	0.4	-0.4	0.0	0.2	0.0	-0.1	-0.5	-0.1	0.2	0.3	15	0.1
67	-0.9	-0.7	-0.7	-0.3	-0.7	-0.5	-1.1	-0.7	-0.4	0.9	-0.4	-1.1	-0.3	-0.5	-0.8	15	0.5
68	-0.4	0.1	0.4	0.5	0.6	0.7	0.4	0.0	0.3	0.2	0.0	0.3	0.1	0.1	1.2	15	0.2
70	-0.2	-0.2	-0.2	-0.3	-0.2	-0.5		-0.5	0.4	0.4	-0.4	-0.2	0.0	-0.2		13	0.1
71	0.3	-0.8	-0.7	-0.5	0.2	-0.7	-0.3	-0.7	-0.1	-0.1	-1.4	-0.9	-0.3	-0.2	-0.2	15	0.4
72	0.2	-1.0	0.0	0.0	0.6	0.2		0.2	-0.1	0.3	0.0	0.0	0.3	-0.5	0.2	14	0.1
74	0.2	0.8	0.6	0.0	-1.5	0.1	0.3	0.6	-0.2	0.1	-0.2	0.1	-0.3	-0.4	0.3	15	0.3
76	-0.1	0.3	0.5	0.7	0.5	0.2	-1.0	0.4	0.1	0.2	0.5	0.4	0.2	0.2	0.2	15	0.2
77	0.3	-0.1	0.1	0.4	0.3	0.4	0.1	1.1	-0.2	-0.4	-0.4	1.0	-0.4	-0.1	0.0	15	0.2
78	-1.0	0.0	0.0	0.2	-2.3	-0.9	1.4	2.5	-0.2	0.2	0.2	0.2	-0.1	1.6	-1.7	15	1.4
79	-1.4	-0.3	-2.0	-2.4	0.1	-1.5	-0.9	-0.5	-0.3	-0.5	-1.2	-1.0	-1.8	-1.1	-1.3	15	1.6
81	0.1	0.3	0.3	0.2	1.3	0.0	0.1	-0.1	0.0	-0.3	0.1	0.0	0.2	0.0	0.5	15	0.2
83	0.3	1.4	0.4	0.8	0.7	0.7	0.4	0.2	0.3	0.0	0.0	-0.3	0.2	0.2	0.3	15	0.3
84	-0.6	0.4	-1.0	-0.6	-1.7	-0.6	1.0	0.0	-1.3	-1.4	-0.9	-0.1	-0.9	-0.3	-1.0	15	0.8
85	0.0	0.0	0.4	0.7	0.0	0.7	0.2	0.2	-0.1	0.4	0.3	0.1	0.1	0.5	0.4	15	0.1
88	0.9	0.5	-0.4	0.0	0.0	-0.3	0.2	1.0	0.4	0.5	-0.4	0.1	-0.7	0.5	0.4	15	0.2
89	0.7	0.2	0.2	-0.2	0.5	0.3	-0.1	0.0	0.7	0.2	0.1	-0.2	-0.4	-0.5	0.1	15	0.1
90	0.3	0.0	0.6	0.0	-0.1	0.4	-0.2	0.8	-0.1	0.7	0.0	-0.2	-0.3	0.0	-0.9	15	0.2
91	2.4	0.4	-0.1	-0.8	-0.7	-0.4	-0.2	-1.1	0.6	0.6	-0.3	-0.3	-0.7	-0.4	-0.5	15	0.7
92	-0.9	-0.4	1.3	-0.3	-4.0	-0.3	-0.2	-0.1	-0.5	-0.2	-0.6	-0.5	-0.4	-0.2	-0.1	14	1.3
93	-0.7	-0.2	0.2	0.0	0.7	-2.0	0.0	-0.6	-0.6	-0.9	-0.1	0.0	-0.3	-0.7	-0.8	15	0.5
95	4.6	-0.5	-0.8	-0.8	-0.4	0.0		-0.2	-0.2	0.6	-0.3	-0.2	-0.4	0.0	0.7	14	1.7
96	2.1	-0.2	0.1	0.4	0.1	0.2	-0.2	0.5	0.5	0.2	0.1	0.1	0.0	0.1	-0.3	15	0.4
97	5.0	0.1	0.3	0.5	0.8	0.8		0.6	0.3	0.5	1.1	0.1	0.5	1.7		13	2.4
98	0.7	0.8	0.3	0.3	0.3	0.4	0.2	0.6	0.3	1.4	0.1	1.1	-0.1	0.0	0.6	15	0.4
99	-0.8	0.2	0.6	0.3	0.3	0.0	0.6	0.4	0.0	-0.4	0.0	1.2	0.0	-0.2	0.3	15	0.2
100	0.1	0.1	-0.1	0.0	-0.3	0.0		-0.3	0.0	-0.4	-0.2	-0.3	-0.3	-0.5	-0.2	14	0.1
102	-0.3	0.5	1.4	0.6	0.5	1.2		0.8	0.1	0.5	0.7	0.1	0.2	0.4	0.5	14	0.4
103	0.5	0.4	0.3	0.6	1.2	0.5	-0.1	0.0	0.6	-0.5	-0.1	0.3	0.1	-0.1	0.0	15	0.2
104	-0.6	-0.4	-0.1	0.1	0.3	0.4	-0.2	0.2	-0.2	0.3	-0.7	0.6	-0.2	-0.4	0.2	15	0.1
105	-0.2	-0.3	-0.9	1.2	-1.1	0.3	0.6	0.7	0.1	-0.3	0.1	0.1	0.1	-0.2	0.2	15	0.3
106	-1.8	-1.5	-1.0	-1.8	-1.4	-1.8		-1.3	-1.2	-0.6	0.6	0.9	1.1	-1.2	-0.5	14	1.6
107	0.1	1.2	-1.7	0.2	-0.8	0.2		0.8	1.1	-0.6	1.0	1.4	0.4	0.4	-0.2	14	0.8
112	-0.2	-0.1	-0.2	-0.1	-0.1	-0.5	-0.5	-0.2	0.0	0.0	-0.3	0.7	-1.0	0.1	0.0	15	0.2
114	-0.1	0.9	0.0	0.7	0.8	0.1		0.1	-0.3	2.0	0.1	0.4	0.6	0.0	-1.0	14	0.5
115	1.1	0.2	-0.2	0.0	0.6	-0.5	-0.6	-0.9	0.0	0.3	-0.5	0.0	-0.4	-0.1	0.7	15	0.3
116	-0.2	-0.1	-2.6	-0.5	-1.3	0.0	-0.2	-0.3	-0.2	0.2	-0.1	0.0	0.3	-0.2	-0.1	15	0.6
119	0.3	0.1	-0.3	-0.2	0.2	-0.3	-4.0	0.9	0.2	0.0	-0.2	-0.5	0.0	-0.5	0.0	14	1.2
120	0.3	0.4	0.5	0.0	0.5	0.2	0.4	0.0	0.8	0.4	0.1	0.0	0.2	0.6	0.1	15	0.2
121	-0.1	0.4	0.7	0.0	1.2	-0.6	-0.1	0.0	-0.1	-0.2	0.3	0.7	0.5	0.3	0.0	15	0.2
123	0.2	0.7	0.9	0.5	0.6	0.2	-4.0	1.1	0.2	-0.6	0.2	-0.8	0.6	0.0	0.0	14	1.4
124	-0.6	0.2	-0.2	0.0	-0.1	0.1	0.2	-0.1	-0.1	0.2	-0.1	0.2	-0.2	-0.2	0.1	15	0.0
125	-0.5	0.1	0.1	0.1	0.1	-0.4		-0.3	-0.2	-0.6	0.2	-0.7	0.0	-0.1	-0.3	14	0.1
126	1.7	0.3	-1.5	0.2	-1.3	-0.5	1.8	0.6	-0.1	0.0	-1.2	0.6	0.5	0.6	1.1	15	0.9
127	0.8	0.3	0.7	1.0	0.5	0.2	0.0	0.2	0.6	0.6	0.5	0.3	-0.2	0.4	0.5	15	0.3
128	-0.1	0.0	0.0	-0.3	-1.0	-0.1	-0.2	0.0	-0.3	0.4	-0.3	-0.2	-0.6	-0.6	0.9	15	0.2
129	0.3	-0.5	0.0	-0.1	-0.6	-0.8	-0.2	-0.5	-0.1	0.1	-0.8	-0.7	-0.4	-0.7	-0.4	15	0.2
131	-0.6	-0.1	0.3	0.2	1.5	1.2	-0.7	-0.6	-0.5	-0.4	0.5	-0.7	-0.1	-0.4	-0.4	15	0.5
133	-0.5	0.5	0.3	-1.4	-1.1	-3.5	0.1	-0.8	-0.8	-1.0	-0.1	-1.9	-0.7	-0.4	0.4	15	1.5

APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

Laboratory Code	Ametoctradin	Azoxystrobin	Bifenthrin	Chlorpyrifos	Cypermethrin (sum)	Diazinon	Flupyradifurone	Fluquinconazole	Fluxapyroxad	Monocrotophos	Myclobutanil	Omethoate	Pyrimethanil	Spiroxamine	Thiabendazole	No. of detected pesticides	AZ^2
	z score																
135	-0.6	-0.2	-1.0	-0.9	-0.5	-0.4		-0.5	0.0	-0.4	0.4	0.1	-0.2	0.0	-0.3	14	0.2
137	-0.3	-0.5	0.1	0.9	0.4	0.2	0.4	1.2	-0.5	0.6	-0.5	0.8	0.2	-0.9	0.2	15	0.4
139	2.2	-0.5	-4.0	-0.2	-0.8	-0.2	-0.8	-0.7	-0.7	3.1	-0.1	0.4	-0.4	0.6	-1.8	14	2.5
140	0.0	-0.4	0.6	1.0	0.7	0.5	-4.0	1.0	-0.4	0.0	-0.3	0.3	0.5	-1.0	0.3	14	1.4
141	0.0	0.5	-0.2	-0.4	0.9	-0.4	0.1	0.1	0.1	-0.1	0.2	-0.2	0.2	0.5	5.0	15	1.8
142	-0.3	0.2	-0.1	-0.5	-0.2	-0.4	0.1	-0.4	-0.2	0.0	-0.5	-0.3	-0.3	-0.1	-0.4	15	0.1
143	-0.9	-0.5	-1.1	-0.6	-1.2	-1.2	-0.4	-0.5	-0.3	0.4	0.2	0.0	-0.5	-0.8	-1.2	15	0.6
144	-0.5	-0.4	-0.4	-0.2	0.3	-0.3	1.0	2.0	0.4	0.3	0.2	0.1	0.0	-0.3	0.0	15	0.4
148	0.2	-0.4	-0.2	-0.1	0.1	0.2	-0.2	0.2	0.2	0.2	-0.1	0.1	0.2	0.2	0.6	15	0.1
150	-0.6	0.1	0.9	0.5	-0.2	-0.3	-0.1	0.2	0.1	-0.3	0.1	-0.4	-0.4	-0.1	-0.3	15	0.1
151	-1.3	0.5	-0.4	0.1	1.6	-0.2	0.2	0.8	-0.3	0.0	0.0	0.1	-0.2	-0.3	0.4	15	0.4
152	-0.2	-0.2	-0.2	-0.3	-1.6	-4.0	-0.2	0.0	-0.3	-4.0	-0.4	0.0	-1.1	0.3	-0.2	13	2.4
153	-0.4	-0.2	0.6	0.3	0.3	-0.5	0.3	-0.2	0.1	-0.4	-0.1	-0.4	-0.3	0.1	2.3	15	0.5
154	-0.2	0.0	-0.7	-0.3	-1.0	-0.1	-0.3	-0.4	0.1	0.0	-0.1	-0.1	-0.3	-0.4	0.4	15	0.2
155	0.1	0.2	1.4	0.0	0.1	0.9		0.5	0.3	0.3	0.3	-0.7	0.1	1.0	0.4	14	0.3
156	-0.9	-0.2	-0.5	-1.0	0.6	-2.4	0.5	-0.1	-0.4	-0.6	-0.8	-0.5	-0.7	-0.2	-0.9	15	0.8
157	5.0	-0.4	0.3	-0.5	0.3	-0.5		-0.7	1.1	-0.3	0.5	1.2	-0.1	0.3	1.6	14	2.3
158	-3.5	-3.1	-3.8	-3.2	-3.7	-2.7	-2.7	-3.3	-2.1	-3.5	-3.0	-3.8	-2.7	-3.2	-4.0	14	10.7
159	-1.5	0.0	-1.1	-0.9	-1.5	-0.3		-0.2	-0.3	-0.1	-0.1	-0.2	-0.3	-0.2	0.9	14	0.6
160	-0.3	0.3	-0.2	2.3	1.3	2.1	-0.1	0.6	0.0	0.6	-0.3	-0.2	0.9	0.5	-0.2	15	0.9
162	0.2	0.3	0.7	0.8	-0.4	0.8		0.4	0.6	0.7	0.5	0.0	0.5	0.4	-0.2	14	0.3
163	-0.3	-0.5	0.3	0.0	-0.2	-0.3	-0.6	-0.9	-1.0	-0.4	-0.9	-0.5	-0.4	-0.6	-0.7	15	0.3
164		0.1	0.1	-1.2	-0.2	-2.1		0.0	0.2	-0.8	-0.1	-0.6	-0.6	-2.4	0.2	13	1.0
165	1.1	-0.9	-2.7	0.0	-0.2	-0.2	2.0	-0.7	2.7	2.7	-0.2	3.1	0.0	0.8	1.4	15	2.7
167	0.3	0.5	0.7	0.3	0.3	0.6	-0.2	-0.1	0.6	-0.5	0.1	0.8	0.2	0.1	0.0	15	0.2
169	-0.2	-0.9	-0.3	0.6	0.1	0.8	-0.1	0.1	-0.9	0.2	0.5	1.0	0.3	0.3	0.4	15	0.3
170	0.1	0.8	0.5	0.7	-0.3	0.3	-0.2	0.4	0.1	1.4	0.4	0.3	0.3	0.4	0.9	15	0.3
172	1.8	-1.1	-4.0	-0.1	-0.6	-0.3	-0.1	-0.5	-1.4	2.5	-0.6	-0.7	-0.4	-1.0	-1.7	14	2.3
173	1.1	0.8	0.3	1.9	-0.3	1.1	0.4	0.7	0.4	0.4	0.6	0.3	0.7	0.1	0.5	15	0.6
174	-0.4	0.0	0.6	1.0	0.2	0.5	-0.1	0.5	-0.1	-0.1	0.3	0.8	0.0	0.0	-0.3	15	0.2
175	-0.6	0.0	-0.1	-0.6	0.2	-0.3	0.1	-0.1	0.1	0.3	-0.3	-0.3	-0.6	0.0	5.0	15	1.8
177	0.8	0.5	1.5	0.7	1.7	-0.2	0.0	0.2	0.7	-0.4	0.2	-0.1	0.7	0.5	0.2	15	0.5
178	-1.9	0.4	-0.2	0.3	-1.1	0.5		-0.5	0.7	0.0	0.5	-0.5	-0.1	-0.5	0.1	14	0.5
180	0.0	-0.4		0.4	0.1	0.4		0.3	0.1	0.3	0.4	-0.2	0.6	0.5	-1.0	13	0.2
183	-0.4	0.3	0.3	-0.2	-0.2	0.0	-0.4	0.4	0.1	-2.7	-0.3	-1.1	-0.3	-0.4	-1.9	15	0.9
184	0.0	0.5	0.1	-0.5	-0.7	-0.5	0.1	0.3	1.3	0.0	0.4	0.1	0.0	0.6	0.3	15	0.2
185	1.7	0.6	0.5	1.8	1.0	0.1	0.0	0.1	0.6	-0.2	0.3	0.6	0.2	0.1	-0.1	15	0.6


EU/EFTA Laboratories
OfL
NRL-FV
Category A: 76 % of the EU/EFTA Laboratories
93 % Good
7 % Satisfactory
1 % Unsatisfactory
4,0
3,0
2,0
1,0
0,0
AZ2

GENERAL PROTOCOL

for EU Proficiency Tests on Pesticide Residues in Food and Feed

11th Edition: Released on 30 December 2023

Introduction

This protocol contains general procedures valid for all European Union Proficiency Testings (EUPTs) organised on behalf of the European Commission, DG-SANTE[1] by the four European Union Reference Laboratories (EURLs) responsible for the area of pesticide residues analysis in food and feed. These EUPTs are organised for laboratories belonging to the Network[2] of National Reference Laboratories (NRLs) and Official Laboratories (OfLs) of the EU Member States. OfLs from EFTA countries and EU-Candidate countries are also welcome to participate in the EUPTs. OfLs from Third countries may be permitted to participate on a case-by-case basis.

The following four EURLs for pesticide residues were appointed by DG-SANTE based on the official controls Regulation (EU) No. 2017/625[3]:

- EURL for Fruits and Vegetables (EURL-FV),
- EURL for Cereals and Feedingstuff (EURL-CF),
- EURL for food of Animal Origin and commodities with high fat content (EURL-AO) and
- EURL for pesticides requiring Single Residue Methods (EURL-SRM).

The aim of these EUPTs is to obtain information regarding the quality, accuracy and comparability of pesticide residue data in food and feed reported to the European Union within the framework of the national control programmes and the EU multiannual co-ordinated control programme[4]. Participating laboratories will be provided with an assessment of their analytical performance that they can use to demonstrate their (ongoing) analytical proficiency and compare themselves with other participating laboratories. By pointing out areas of analytical deficiencies, EUPTs contribute to the continuous improvement of the analytical quality of OfLs, thus helping to increase the confidence on the results generated by them.

EUPT- Organisers and Scientific Committee

EUPTs are organised either by single EURLs, or collaboratively by more than one EURL.

An organising team (in the following named organisers[5]) is appointed by the EURL(s) in charge of a given PT. The organisers are in charge of all administrative and technical PT activities of a proficiency testing (PT) round. These tasks include the PT-announcement, the production of the proficiency testing item (PT-item), the undertaking of homogeneity and stability assessments, the portioning, packing and shipment of the PT-Items, the handling and evaluation of the results and method information submitted by the participants, the drafting of the preliminary and final reports as well as the generation and distribution of EUPT-participation certificates.

To complement the internal expertise of the EURLs, a group of external consultants forming the EUPT-Scientific Committee (EUPT-SC)[6] has been established and approved by DG-SANTE. The EUPT-SC consists of expert scientists with many years of experience in PTs and/or pesticide residue analysis. The latest composition of the EUPT-SC and the affiliation of each of its members is shown on the EURL-Website. The members of the EUPT-SC are also listed in the Specific Protocol and the Final Report of each EUPT.

The EUPT-SC is made up of the following two subgroups:

An independent Quality Control Group (EUPT-QCG) and An Advisory Group (EUPT-AG).

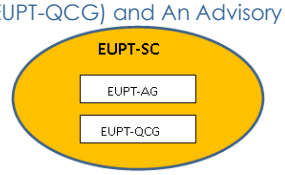


Figure 1: Composition of EUPT-Scientific Committee

The EUPT-SC's role is to assist the organisers during the planning and the data evaluation phase of a PT-round. Input from the EUPT-SC is requested, when it comes to e.g. selecting the commodities for the EUPTs of the following season, selecting the analytes to be included in the Target Pesticides List (p. 8), establishing the Minimum Required Reporting Levels (MRRLs) for each of the analytes, and statistically evaluating the participants' results (in anonymous form). The EUPT-SC is furthermore consulted when it comes to drafting and updating documents, such as the General and Specific PT Protocols and the Final EUPT-Reports.

The EUPT-QCG has the additional function of supervising the quality of EUPTs and of assisting the EURLs in confidential aspects such as the choice of the analytes to be present in the PT item and the approximate concentrations at which they should be present.

[1] DG-SANTE = European Commission, Health and Food Safety Directorate-General

[2] For more information about the EURL/NRL/OfL-Network please refer to the EURL-Web-portal under: "http://www.eurl-pesticides.eu"

[3] Regulation (EU) 2017/625 of the European Parliament and of the Council on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products.. Published at OJ of the EU L95 of 07.04.2017

[4] European Commission Proficiency Tests for Pesticide Residues in Fruits and Vegetables, Trends in Analytical Chemistry, 2010, 29 (1), 70 – 83.

[5] The term organisers is to be considered equivalent to the term PT-provider in ISO 17043:2023

[6] Link to the List of current members of the EUPT Scientific Committee: http://www.eurl-pesticides.eu/library/docs/allcrl/EUPT-SC.pdf

The EUPT-SC typically meets once a year, after all EUPTs of the season have been conducted and preliminarily evaluated by the four pesticide EURLs. The aim of these meetings is to discuss the preliminary evaluation of the EUPT-results, especially where case-by-case decisions are needed. PT plans for the next EUPT season and, if needed, possible changes in the EUPT-General Protocol are also discussed during these meetings. The main topics and decisions on these meetings are documented.
The present EUPT General Protocol (EUPT-GP) was drafted by the EURLs and reviewed by the EUPT-SC. Follow the link to access a website giving an overview of EUPT-GP versions. The latest version of the EUPT-GP is highlighted.

EUPT Participants – Eligibility and Obligation for Participation
Within the European Union, all NRLs operating in the same area as the organising EURL, as well as all OfLs whose scope overlaps with that of the EUPT, are legally obliged to participate in EUPTs. The legal obligation of NRLs and OfLs to participate in EUPTs arises from:

- Art 38 (2) of Regulation (EU) No. 2017/6253
- Art. 28 (3) of Reg. (EC) No. 2005/396 (for all OfLs analysing for pesticide residues within the framework of official controls of food or feed[7])
- Art. 101 (1)(a) of Regulation (EU) No. 2017/6253 (for all NRLs).

Every year, shortly before launching the registration period of the first of the four EUPTs in a given EUPT-Season, all OfLs and NRLs are asked to update their routine scope of commodities as well their contact information within the EURL-DataPool. Based on this information the OfLs are classified into those that are obliged and those that are eligible to participate in each of the EUPTs to be conducted within a given year.
NRLs are responsible for checking whether all relevant OfLs within their network are included in the list of obliged laboratories with their current commodity-scopes and contact information.
OfLs are furthermore urged to keep their own profiles within the EURL-DataPool up-to-date, especially their commodity and pesticide scopes and their contact information.
Labs that are obliged to participate in a given EUPT, but are not able to participate, must provide the reasons for their non-participation. This also applies to any participating laboratories failing to report results.
EUPTs are furthermore open to the following laboratories as long as sufficient material is available:

a) any other OfLs from EU countries that are not covered by the above obligations to participate;
b) NRLs and OfLs from EU-candidate countries and EFTA countries;
c) other laboratories from EU or EFTA countries analysing official organic samples within the frame of Reg. 889/2008/EC;
d) governmental laboratories from Third Countries (countries outside EU)
e) other laboratories from Third Countries as long as they are involved in controls of products destined for export to the EU.

Note on a): Laboratories having been designated as OfLs, according to Art. 37(2)(b) of Regulation (EU) No. 2017/6253 by a Competent Authority of an EU Member State (MS1) will normally also need to be commissioned with OfL activities in a different EU Member State (MS2) for being eligible for participation. Scan-copies of documents giving information about the period and scope of these OfL activities for MS2 may be requested by the EUPT organizers. The responsible NRL and/or Competent Authority of MS2 may be contacted before deciding whether the laboratory in question is eligible or even obliged to participate in a certain PT. A laboratory whose OfL-appointment in the area of pesticide residue analysis has ceased, will normally loose its eligibility (and obligation) to participate in EUPTs, but participation may be allowed if the responsible NRL and/or Competent Authority of MS1 or MS2 considers its participation essential for judging the proficiency in view of a planned or potential OfL activity in the future.
Laboratories of groups c) and e) will be requested to provide a proof of their function (e.g. scan copy of a document stating official appointment).

Obligation of OfLs and NRLs to double-check Status of EUPT-Participation:
Based on the latest information within the DataPool and considering the selected commodities of the upcoming EUPTs, the OfLs (including the NRLs) are grouped into those for which participation in a given EUPT is obligatory and those for which participation is voluntary ("OV-grouping").
Upon accessing the EUPT Registration Form within the EURL-DataPool, laboratories can choose the EUPTs they would like to participate and view their OV-grouping status for each of the selected PTs. If a laboratory does not agree with its OV-Grouping, it should promptly contact the corresponding NRL and the EUPT-organisers and give the reasons why it believes it should be grouped differently. The reasons provided by the laboratories will be noted by the organisers and if indicated, the DataPool will be updated accordingly. In any case, the OV-grouping prepared by the EURLs is indicative only, as the real obligation to participate in a given EUPT arises from the above- mentioned EU-regulations, not the DataPool entries or any lab's claims. Additional requirements may arise from accreditation bodies or local rules and regulations.
OfLs that are obliged but not able to participate in a given EUPT must provide the reasons for their non-participation. This also applies to any participating laboratories that fail to submit PT-results.
Within the DataPool, NRLs have the possibility to view data relevant to OfLs within their network (OV- grouping, registration progress) and are responsible for checking whether the OV- grouping of all relevant OfLs within their network is correct.

[7] Official controls in the sense of Regulation (EU) 2017/625. This includes labs involved in controls within the framework of national and/or EU programs, as well as labs involved in import controls according to Regulation (EU) 2019/1793 (which repealed Regulation (EC) No. 2009/669).

Participation fee and Invoicing
By completing the registration for participation in a given EUPT, a laboratory agrees to proceed with a timely payment of the participation fee after being accepted for participation and after the invoice issued by the organiser is received. The invoice fee covers the costs of production, handling and delivery of the PT-materials. The organisers will issue digital invoices in PDF format only, and without any electronic signature. By registering to an EUPT the laboratories also accept that the pdf invoice, issued by the organisers and sent via e-mail to the participant, is sufficient for triggering the payment of the participation fee. The EURLs retain the right to decline any request for supplementary forms or additional paperwork in connection to the payment. The laboratories should note that additional costs may incur if such extra services are requested, depending on the incurring extra workload. Extra costs may also incur if new modified invoice is requested, e.g. because of missing or erroneous information caused by errors or omissions by the registered laboratory during registration. OfLs not paying the EUPT participation fee will be initially reminded, and then warned that information concerning their laboratory may be blacked out in the final report of the concerned EUPT and the certificate of participation may not be issued to them, and that their participation in subsequent EUPTs could be denied. In case of a repetitive non-payment, the EUPT organisers may inform the corresponding NRL and/or the competent authority responsible for the OfL.

Confidentiality and Communication
The proprietor of all EUPT data is DG-SANTE and as such has access to all information.
For each EUPT, the laboratories are given a unique code (lab code), initially only known to themselves and the organisers. In the final EUPT-Report, the names of participating laboratories will not be linked to their laboratory codes. It should be noted, however, that the organisers, at the request by DG-SANTE, may present the EUPT-results on a country-by-country basis. It may therefore be possible that a link between codes and laboratories could be made, especially for those countries where only one laboratory has participated. Furthermore, the EURLs reserve the right to share EUPT results and codes amongst themselves: for example, for the purpose of evaluating overall laboratory or country performance as requested by DG-SANTE.
As laid down in Regulation (EU) No. 2017/6253, NRLs are responsible for evaluating and improving their own OfL-Network. On request from the NRLs, the EURLs will provide them with the PT-codes of the participating OfLs belonging to their OfL-Network. This will allow NRLs to follow the participation and performance of the laboratories within their network.
Communication between participating laboratories during the test, on matters concerning a PT exercise, is not permitted from the start of the PT exercise until the preliminary report distribution.
For each EUPT the organising EURL prepares a specific EUPT-Website where all PT-relevant documents in their latest version are linked. In case of important modifications on any of these documents, the participating laboratories will be informed via e-mail. In any case, as soon as the PT- period starts the participants are encouraged to visit the particular EUPT-Website, to make sure that they are using the latest versions of all PT-relevant documents. The official language used in all EUPTs is English.

Announcement / Invitation Letter
Approximately 3 months before the distribution of the PT items to the participants the EURLs will publish an Announcement/Invitation letter on the EURL-web-portal and distribute it via e-mail to the NRL/OfL mailing list available to the EURLs. This letter will inform about the commodity to be used for preparing the PT item, as well as links to the tentative EUPT-Target Pesticides List and the tentative EUPT-Calendar.

Target Pesticides List and PT-Residue Definitions
The Target Pesticides List contains all analytes (pesticides and metabolites) to be sought for, along with the Minimum Required Reporting Levels (MRRLs) valid for the specific EUPT. The MRRLs are typically based upon the lowest MRLs found either in Regulation (EC) No. 2005/396 or in Regulation (EU) No. 2016/128 (Baby Food Directive).
The residue definition in an EUPT may differ from the legal one if this is deemed necessary by the organisers for ensuring a better evaluation of the results. Participants must express their results as defined in the Target Pesticides List of the respective EUPT. Separately quantifiable analytes are typically listed separately unless stated otherwise.

Specific Protocol
For each EUPT, the organising EURL will publish a Specific Protocol at least 2 weeks before the PT item is distributed to the participating laboratories. The Specific Protocol will contain all the information previously included in the Invitation Letter but in its final version, information on payment and delivery, instructions on how to handle the PT item upon receipt and on how to submit results, as well as other relevant information.

Assessing the Homogeneity of the PT Item
A suitable homogeneity of the EUPT item is of high importance as it ensures that portion-to-portion variability has only a negligible impact on the evaluation of the participant's performance.
The PT item is tested for homogeneity, typically after bottling and before distribution to participants, but in justifiable cases the tests for homogeneity assessment may also be conducted after the distribution of the material to the participants[8]. The homogeneity assessment usually involves analysis of two replicate analytical portions, taken from at least ten randomly chosen units (bottled portions) of treated PT item.

[8] To minimize the risk of PT item not being acceptably homogeneous, the organisers may opt to conduct a small-scale preliminary homogeneity test prior to bottling the PT item for shipment. The pre-tests may focus on a selected fraction of the analytes, and may also serve for verifying the presence and the approximate levels of the analytes spiked.

Measurements should be conducted in random order with the aim of minimizing the risk of misinterpreting signal drifts within a measurement sequence as concentration shifts linked to the bottle numbering, i.e. the order of the bottle filling.
The homogeneity test data are statistically evaluated according to ISO 13528:2022, Annex B[9] or to the International Harmonized Protocols jointly published by ISO, AOAC and IUPAC[10]. The results of all homogeneity assessment are presented to the EUPT-SC. In special cases, where the above criteria are not met, the EUPT-SC, considering all relevant aspects (e.g. the homogeneity results of other analytes spiked at the same time, the overall distribution of the participants' results (CV^*), the analytical difficulties faced during the tests, and knowledge of the analytical behaviour of the compound in question), may decide to overrule the test. The reasons of this overruling have to be transparently explained in the Final EUPT-Report. For certain analytes with comparable properties, an equivalent distribution within the sample can be expected if they were spiked/used simultaneously. The homogeneity test of one or more of these analytes may thus be skipped or simplified. The organisers should keep an eye on the participants' results of such analytes not tested for homogeneity in order to detect at an early stage any signs that could raise doubts about the homogeneity of the material (e.g. an atypically broad distribution of the results compared to other analytes). In such a case, the EUPT-SC may decide that a proper homogeneity assessment should still be performed to clarify the situation.

Assessing the Stability of the Analytes Contained in the PT Item
The PT item will also be tested for stability - according to ISO 13528:2022, Annex B[9]. The time delay between the first and the last stability test (stability assessment period) must exceed the period of the EUPT-exercise. Typically, the first analysis is carried out shortly before the shipment of the PT items and the last one shortly after the deadline for submission of results. If justifiable, the stability assessment period may precede the PT period, partly overlap with it or postdate it. Close proximity to the PT-period is to be favoured, however, to minimize the risk that matrix properties alter in a way that will affect analyte stability. To better recognise trends and gain additional certainty, one or more additional tests may be conducted by the organisers in the interim. At least 6 sub-samples (analytical portions) should be analysed on each test day (e.g. 2 analytical portions withdrawn from three randomly chosen containers OR 6 portions withdrawn from a single container). In principle, all analytes contained in the PT item should be checked for stability. However, in individual cases, where sufficient knowledge exists that the stability of a certain analyte is very unlikely to be significantly affected during storage (e.g. based on experience from past stability tests or knowledge of its physicochemical properties), the organisers, after consultation with the EUPT-QCG, may decide to omit a specific stability test. The EUPT-SC will finally decide whether analytes for which the stability test was not undertaken will be included in the Final EUPT-Report, considering all relevant aspects, such as the distribution of the participant's results (CV^*).
An analyte is considered to be adequately stable if $|\ yi - y\ | \leq 0.3 \times \sigma pt$, with yi being the mean value of the results of the last stability test, y being the mean value of the results of the first stability test and σpt being the standard deviation used for proficiency assessment (typically 25 % of the assigned value by default).
The results of all stability tests are presented to the EUPT-SC. In special cases, where the above stability test criteria are not met, the EUPT-SC considering all relevant aspects (e.g. the past experience with the stability of the compound, the overall distribution the participants' results, the measurement variability, analytical difficulties faced during the test and knowledge about the analytical behaviour of the compound in question) may decide to overrule the test. The reasons of this overruling will be transparently explained in the Final EUPT-Report.
The organisers may also decide to conduct additional stability tests at storage conditions other than those recommended to the participants e.g. at ambient temperature.
If insight about insufficient analyte stability is gained before the end of the PT-period, the EUPT- QCG will be contacted in order to decide whether the EUPT-SC should be involved in the discussion (as confidential information is involved), whether the PT-participants should be informed about this insight and whether the affected analytes should be removed from the target list.

Stability during shipment: Considering knowledge about the expected susceptibility of analytes in the PT item to possible losses, the organisers will choose suitable shipping conditions to minimize such losses, e.g. shipment of frozen samples, addition of dry ice. As shipment duration can vary from labs/countries to labs/countries, it is recommended that the organisers keep track of the shipment duration and then decide whether it is reasonable to conduct additional stability tests at conditions simulating shipment. Should critical losses be detected for certain analytes, the EUPT- SC will be informed (or the EUPT-QCG before or during the test). Case-by-case decisions may be made by the EUPT-SC, considering all relevant aspects including the duration and conditions of the shipment to the laboratory as well as the feedback by the laboratory. Follow-up measures in case of instability during shipment may include the exclusion of the affected results from the population used for establishing the assigned value (xpt) and the non-calculation of z scores for the affected analytes in order to avoid unfair penalization of the laboratories involved.
If the PT entails analytes that are expected to have a high risk of degradation within the PT item, the organisers should conduct model tests prior to the final preparation of the test item in order to gain insight about the stability behavior of the analytes intended to be spiked during homogenization, transport and storage of the samples. Based on the results of these experiments measures should be taken to minimize the risk of certain analytes failing to meet the stability criteria, which may include adjusting the conditions of homogenization and/or storage and/or shipment or even deciding not to spike the material with certain analytes.

[9] ISO 13528:2022: 'Statistical methods for use in proficiency testing by interlaboratory comparisons", International Organization for Standardization.
[10] Thompson M., Ellison S.L.R., Wood R., "The International Harmonized Protocol for the proficiency testing of analytical chemistry laboratories" (IUPAC Technical Report). Pure Appl. Chem. 2006, 78, 145 □ 196

Methodologies to be used by the Participants
Participating laboratories are instructed to use the analytical procedure(s) that they would routinely employ in official control activities (monitoring etc.). Where an analytical method has not yet been established routinely, this should be stated. This can be done via the EURL data submission tool (in the following named Webtool) by answering the question whether the concerned analyte is included within the routine scope of the laboratory and the question about the analytical experience with the compound.

General Procedures for Reporting Results
Participating laboratories are responsible for reporting their own quantitative results to the organiser within the stipulated deadline. Any analyte targeted by a participating laboratory should be reported as "analysed" in the Webtool. In EUPTs by EURLs responsible for MRM compounds (FV, CF, AO) this is done before shipment of the PT test Item. In EUPT-SRMs this is done in the period during which the platform is open for result submission. Each laboratory will be able to report only one result for each analyte detected in the PT item. The concentrations of the analytes detected should be expressed in 'mg/kg' unless indicated otherwise in the specific protocol of the respective EUPT.
For reporting, concentration values ≤ 0.01 mg/kg are recommended being rounded to two significant figures (e.g. 0.0078; 0.010) and values > 0.01 mg/kg to three significant figures (e.g. 0.123; 1.23; 12.3mg/kg).No penalties will apply where a laboratory reports deviating numbers of significant figures, but in case of less significant figures, zeros will be assumed after the last significant figure (e.g. 0.1 = 0.100 and 0.11 = 0.110). For the calculation of z scores the values will be used as reported. In the preliminary and final report the results will be shown with up to three significant figures.
Laboratories should not report results below their own reporting limits (RLs). Any reported numerical result that is lower than the RL will be marked as a 'False Reporting' (FR) but it will be allocated a z score as any other numerical result. Such results will be, furthermore, included in the results population for establishing the assigned value (xpt), unless they are eliminated for other reasons (e.g. laboratory status, use of biased methodology).

Correction of Results for Bias
According to the DG-SANTE Guidelines, the result of an analyte needs to be adjusted for method bias if the bias exceeds 20%. Unless the method used inherently accounts for method bias (see cases a – c below), laboratories are required to report the recovery (in percent), and whether their results was corrected mathematically using a recovery factor reflecting the reported recovery.
The EUPT-Panel will examine whether results, for which no correction for bias was undertaken, should be omitted from the population used for calculating the assigned value.
When the laboratory uses any of the following approaches inherently accounting for method bias, this needs to be indicated in the appropriate fields within the Webtool. In such cases, reporting of the recovery rate is not mandatory.

a) use of stable isotope labelled analogues of the target analytes as Internal Standard (ILISs), added to the analytical portion at an early stage of the procedure
b) 'procedural calibration' approach
c) 'standard addition' approach with additions of analyte(s) to the analytical portions before extraction.

Methodology Information
All laboratories are requested to provide information on the analytical method(s) they have used. The Webtool, which serves for submitting analytical results, is typically also used for collecting method information.
The collection of method information is considered very important by the EUPT-SC as it facilitates the interpretation of results and the identification of analytical patterns associated with systematically biased results. A compilation of the methodology information submitted by all participants may be presented in an Annex of the Final EUPT-Report or in a separate report. Where the initial method information provided by the participating laboratories is not sufficient for evaluating methodology- related errors or where additional information critical for results evaluation is needed, the EURLs and/or the EUPT-Panel may decide to conduct specific follow-up surveys among the concerned laboratories. If no sufficient information on the methodology used is provided, the organisers reserve the right not to accept the analytical results reported by the participants concerned or even refuse participation in the following PT.
Where necessary, the methods are evaluated and discussed within the EUPT-SC, especially in those cases where the result distribution is not unimodal or very broad (e.g. CV^* > 35 %).
Where certain methodologies or analytical steps are suspected to lead to biased or otherwise erroneous results, the PT-organisers will substantiate this suspicion by own experiments and discuss the issue with the EUPT-SC. Laboratories affected will be informed, e.g. via direct contact and/or via EURL-workshops or trainings and/or through the inclusion of recommendations within the Final EUPT Report.
Cases where reporting limits (RL) of laboratories exceed the MRRL indicate insufficient sensitivity and may be highlighted in the final report as with "PS" for poor sensitivity.

Results Evaluation
The procedures used for the treatment and assessment of results are described below.
–False Positive (FP) Results
These are results of analytes on the Target Pesticides List that are reported at or above their respective MRRL although they were: (i) "not detected"[11] by the organiser, even after repeated analyses, and/or (ii) "not detected" by the overwhelming majority (e.g. > 95 %) of the participating laboratories that had targeted the specific analytes. In certain instances, case-by-case decisions by the EUPT-SC may be necessary.

[11] The term "not detected" is also used in the Webtool. In this context this term entails also all cases where no numerical result were reported (e.g. because the level determined was < MRRL and/or < RL)

Any results reported lower than the MRRL will not be considered as false positives, even though these results should not have been reported. If these results are additionally lower than the lab's reporting limit, they will be attributed with FR ('False Reporting').

–False Negative (FN) Results

These are results of analytes reported by the laboratories as 'analysed' but without reporting numerical values although they were: a) used by the organiser to treat the PT item and b) detected by the organiser as well as the majority of the participants that had targeted these specific analytes at or above the respective MRRLs. Numerical results < RL (RL= Reporting Limit of the laboratory) may be judged as false negatives and may be also regarded as "not correctly found" when it comes to categorization in A and B based on scope. Such results wouldn't be reported in a routine laboratory environment. Case-by-case decisions by the EUPT-Panel will be taken by the EUPT-SC in such cases.

Where the RL of a laboratory for a certain analyte present in the PT item exceeds the assigned value, with the laboratory not reporting a numerical value, the result may still be judged as a false negative, despite this reporting being unobjectionable in a routine working environment. The FN judgement should in this case penalize the laboratory for not being able to achieve sufficient sensitivity for the analyte in question.

In cases of the robust mean of the participant results being less than 3 times higher than the MRRL, false negatives will typically not be assigned. The EUPT-SC may decide to make case-by-case decisions in this respect after considering all relevant factors such as the result distribution and the RLs of the affected labs. In case where the not fixing a valid assigned value is due to other reasons,

e.g. because the uncertainty of the assigned value (UAV) criteria were not met and/or because of a bimodal distribution of the participant results, the EUPT-SC will decide on case-by-case basis whether FNs should be assigned for the respective analyte or not.

–Estimation of the Assigned Value (xpt)

To minimise the influence of out-lying results on the statistical evaluation, the assigned value xpt (= consensus concentration) will typically be estimated using the robust mean estimate of the participant results (x^*) as described in ISO 13528:2022[12], taking into account the results reported by EU and EFTA countries laboratories only.

In special justifiable cases, the EUPT-Panel may decide to include results submitted by laboratories not belonging to the EU-/EFTA-OfLs network or even to use only the results of a subgroup of ('expert') laboratories that have previously repeatedly demonstrated good performance for the specific or similar compounds.

Furthermore, the EUPT-Panel may decide to eliminate certain results traceably associated with bias or gross errors for establishing the assigned value (see 'Omission or Exclusion of results' below).

In special justifiable cases, the EUPT-Panel may furthermore decide to use the spiked concentration of an analyte as the best estimate of the assigned value. In such cases, a detailed explanation of the reasons behind this decision will be given and a comparison with calculations involving robust statistics will be undertaken.

In reports, assigned values will be rounded to 3 significant figures if ≥ 0.01 mg/kg and to 2 significant figures if < 0.01 mg/kg (i.e. 0.0078; 0,123; 1.23; 12.3 mg/kg). For the calculation of z scores, the organisers may opt to use assigned values rounded to more significant figures than those stated above.

Since the assigned values of the EUPT analytes are typically generated using robust mean concentrations of participant results, which are generated by a variety of analytical standards and methods, the assigned values of EUPTs are typically metrologically not traceable.

–Omission or Exclusion of Results

Results reported by laboratories from non-EU and non-EFTA Member States are typically excluded from the population used to derive the assigned value (for exceptions see 'Estimation of the assigned value').

Before estimating the assigned value, results associated with obvious mistakes have to be examined to decide whether they should be removed from the population. Such gross errors may include incorrect recording (e.g. due to transcription errors by the participant, decimal point faults or transposed digits, incorrect unit), calculation errors (e.g. missing factors), analysis of a wrong sample/extract (e.g. a spiked blank), use of wrong concentrations of standard solutions, incorrect data processing (e.g. integration of wrong peak), inappropriate storage or transport conditions (in case of susceptible compounds), and the use of inappropriate analytical steps or procedures that demonstrably lead to significantly biased results (e.g. employing inappropriate internal standards or analytical steps or conditions leading to considerable losses, due to degradations, adsorptions, incomplete extractions, partitioning etc.). Where the organisers (e.g. after the publication of the preliminary report) receive information that certain participant's results are associated with gross errors, the affected results will be examined on a case-by-case basis to decide whether, or not, they should be excluded from the population used for robust statistics. Results may also be omitted e.g. if an inappropriate method has been used even if they are not outliers.

In case of traceable calculation errors by the participants (e.g. use of wrong factors to express the result as required by the PT's residue definition[13]), and in case of non-reporting results that can be calculated from reported values (e.g. summed result not calculated and not reported), the EUPT- Panel may decide to correct or complement results within the population by applying (the correct) factors. The new population of results may then be used for establishing the assigned values. The z score of the concerned results will, however, be calculated using the originally reported values.

[12] ISO 13528:2022 'Statistical methods for use in proficiency testing by interlaboratory comparisons", International Organization for Standardization. Therein a specific robust method for determination of the consensus mean and standard deviation without the need for removal of deviating results is described (Algorithm A in Annex C)

[13] irrespective of who is accounted responsible for the confusion

Although robust statistics are applied for estimating assigned values and robust standard deviations, certain results showing a strong bias compared to the rest of the population may be, in certain cases, eliminated before applying robust statistics[14]. To identify such strongly biased results, a preliminary consensus calculation of the robust mean (prelim-x^*) may be conducted and any results being ≥ 3- fold the prelim-x^*[15] may be potentially eliminated. This approach may need to be iterated if the population still entails obvious outliers.
The result population remaining after the elimination of certain results as described above may be then used to establish the actual assigned value (xpt) and the robust standard deviation (s^*) according to the consensus approach described above. The z scores of all results, including those corrected or removed, are to be recalculated using the new assigned value.
All decisions to omit/exclude results will be discussed with the EUPT-SC and the reasoning for the omission of each result clearly stated in the Final EUPT-Report. However, z scores will be calculated for all results irrespective of the fact that they were omitted from the calculation of the assigned value.
Omitted results might be interesting as they might give indications about possible source(s) of errors. The organisers will thus ask the relevant lab(s) to provide feedback on possible sources of errors (see also "follow-up activities").

–Uncertainty of the Assigned Value ($u\,(xpt)$)
The uncertainty of the robust mean values (xpt) is calculated according to ISO 13528:2022 as:

$$u(xpt) = 1.25x\frac{s^*}{\sqrt{p}}$$

where s^* is the robust standard deviation and p is the number of results.
A broad results distribution (high s^*) and/or a limited number of results (p) will increase the uncertainty of the robust mean $u(xpt)$ values exceeding 0.3×σpt (see ISO 13528:2022) will typically mean that the robust mean is too uncertain for the purpose and cannot be straightforwardly taken up as the assigned value. In each of these cases, investigations for elucidating the reasons behind the high uncertainty should be undertaken. Taking into account all relevant aspects[16] the EUPT-SC may decide that the analyte results should be re-evaluated based on a refined or extended result population or an alternative approach. If, despite these considerations and irrespective of the outcome of the UAV test the EUPT-SC concludes that, the assigned value of a specific analyte is too uncertain for a valid evaluation, it may decide that the results for the analyte in question should not be evaluated or only evaluated for informative purposes.

–Considering the UAV when Calculating z Scores
Where the vast majority of the results is close to the robust mean and narrowly distributed but the UAV-test is still marginally failing[17] (e.g. where $u(xpt)$ is up to 0.4×σpt = 10% in absolute terms), the EUPT-Panel may consider to calculate z' scores using the following formula, which considers the uncertainty of the assigned value:

$$z' = \frac{x_i - x_{pt}}{\sqrt{\delta_{pt}^2 + u^2(x_{pt})}}$$

where $u(xpt)$ being the uncertainty of the assigned value and σpt being the standard deviation of the assigned value that may be set equal to FFP-σpt (see below). z' scores will be shown for Informative purposes only.
In special cases[18], the EUPT-SC may consider useful to proceed with the calculation of z scores for both extremes of the assigned value as derived by applying the UAV (i.e. $xpt \pm (xpt)$). This upper and lower bound calculation of the z scores will also be for informative purposes only. The aim of this calculation is to help laboratories having performed well in a PT demonstrate their good performance even in cases where the UAV-test has not passed the criteria. Example: xpt = 1.0 mg/kg, (xpt) = 0.1. Taking into account the calculated uncertainty, the AV should range between 0.9 and 1.1 mg/kg. If the result of a laboratory is 0.7 mg/kg, the z score calculates to -1.2 using xpt = 1.0 mg/kg, For the upper limit of xpt = 1.1 the z score calculates to -1.76 and for the lower limit of xpt =0.9 the z score calculates to -0.72. This means that, even at worst-case scenario, the laboratory's result remains within the acceptable range.

–Standard Deviation for Proficiency Assessment (Target Standard Deviation)
The standard deviation for proficiency assessment (σpt) will be calculated using a Fit-For-Purpose approach with a fixed Relative Standard Deviation (FFP-RSD). Based on experience from previous EUPTs[19], a percentage of 25 % is currently used as FFP-RSD for all analyte-matrix combination, and the Fit-For-Purpose target standard deviation (FFP-σpt) is calculated as follows:

$$FFP\text{-}\sigma pt = 0.25 \times xpt$$

The EUPT-SC reserves the right to also employ other FFP-RSDs or other approaches for setting the assigned value on a case-by-case basis, considering analytical difficulties and experience gained from previous proficiency testings.
For informative purposes the robust relative standard deviation (CV^*) of the participants results is calculated according to ISO 13528:2022; Chapter 7.7 following Algorithm A in Annex C (so called "consensus approach from participant results").

[14] Please see ISO 13528:2022 Chapter 6.6." Outlier techniques for individual results', therein 6.6.3, Note 3.
[15] Corresponds to preliminary z scores ≥ 8 using the FFP-approach
[16] e.g. information about methodologies used by the participants (especially if these are likely to produce biased results), multimodality, number of submitted results, homogeneity data, stability data
[17] e.g. due to a combination of few results, and sporadic biased results.
[18] E.g. where the population of results is narrow, but the UAV tests fails due to a few deviating results in combination with a relatively small number of results, e.g. <20
[19] Comparative Study of the Main Top-down Approaches for the Estimation of Measurement Uncertainty in Multiresidue Analysis of Pesticides in Fruits and Vegetables. J. Agric. Food Chem., 2011, 59(14), 7609-7619. DOI:10.1021/jf104060h

−z Scores

This parameter is calculated using the following formula:

$$z_i = \frac{(x_i - x_{pt})}{FFP - \delta_{pt}}$$

where xi is the value reported by the laboratory, xpt is the assigned value, and FFP-σpt is the standard deviation using the FFP approach. Z scores shown in the preliminary and Final EUPT-Report will be rounded to one decimal place. For the calculation of combined z scores (see below) the original z scores will be used and the combined z scores will be rounded to one decimal place after calculation.

For practical reasons, any z scores > 5 will be typically reported as '> 5' and a value of '5' will be used to calculate combined z scores (p. 19). Following ISO 17043:2023[20], z scores will be classified as follows:

$|z| \leq 2.0$ Acceptable

$2.0 < |z| < 3.0$ Questionable

$|z| \geq 3.0$ Unacceptable

All false negatives will be assigned a z score of -4. These z scores will typically appear in the z score histograms and will be used in the calculation of combined z scores.

−Collection of Measurement Uncertainty (MU) Figures

For each EUPT the participating labs are asked to voluntarily report the MU figure they would report in routine analyses. The EUPT-SC will decide how to evaluate these figures and whether indications will be made to the laboratories in this regard.

−Categorization of Laboratories

The EUPT-SC will decide if and how to classify the laboratories into categories based on their scope and/or performance. Currently, a scope-based classification into Category A and Category B is employed. Laboratories that have:

a) analysed at least 90% of the compulsory analytes in the target pesticides list,
b) reported numerical results for at least 90 % of the compulsory analytes present in the PT item
c) reported no false positives

are considered to have demonstrated 'sufficient scope' and will be therefore classified into Category A. For the 90% criterion, the number of analytes needed to be correctly analysed to have sufficient scope will be calculated by multiplying the number of compulsory analytes from the Target Pesticides List by 0.9 and rounding to the nearest full number with 0.5 decimals being rounded downwards (see some examples in Table 1).

Table 1: Number of analytes from the Target Pesticides List needed to be targeted or analytes present in the PT item that need to be correctly detected and quantified to have sufficient scope.

No. of compulsory analytes present in the PT item / target pesticides list (N)	90 %	No. of compulsory analytes needed to be correctly detected and quantified / targeted to have sufficient scope (n)	n
3	2.7	3	N
4	3.6	4	
5	4.5	4	N - 1
6	5.4	5	
7	6.3	6	
8	7.2	7	
9	8.1	8	
10	9.0	9	
11	9.9	10	
12	10.8	11	
13	11.7	12	
14	12.6	13	
15	13.5	13	N - 2
16	14.4	14	
17	15.3	15	
18	16.2	16	
19	17.1	17	
20	18	18	
21	18.9	19	
22	19.8	20	
23	20.7	21	
24	21.6	22	
25	22.5	22	N - 3
26	23.4	23	

[20] ISO/IEC 17043:2023. Conformity assessment – General requirements for the competence of proficiency testing providers

–Overall Performance of Laboratories - Combined z Scores

For evaluation of the overall performance of laboratories the average of the squared z scores ($AZ2$)[21] and/or the average of the absolute z scores (AAZ) can be calculated for informative purposes. To minimize the influence of outlying results, the calculation of $AZ2$ and AAZ will not be conducted in the case of < 10 and < 5 results, respectively, and z scores higher than 5 will be set as 5. Combined z scores are typically only calculated for laboratories within Category A and considering results of compulsory analytes, but the organisers may deviate from this if considered reasonable, provided that a minimum number of results (z scores) have been reported. Combined z scores may be also calculated using results of across PTs.

Considering the cut-off of high z scores at 5, the $AZ2$ is calculated as follows:

$$AZ^2 = \frac{\sum_{i=1}^{n} z_i^2}{n}$$

Where n is the number of z scores to be considered in the calculation. Based on the $AZ2$ achieved, the laboratories are classified as follows:

$AZ2 \leq 2.0$	Good
$2.0 < AZ2 < 3.0$	Satisfactory
$AZ2 \geq 3.0$	Unsatisfactory

Combined z scores are considered to be of lesser importance than individual z scores. The EUPT- SC retains the right not to calculate $AZ2$ if it is considered as not being useful or if the number of results reported by any participant is considered being too low.

In the case of EUPT-SRMs, where only a few results per laboratory may be available, the average of the absolute z scores (AAZ) may be calculated for informative purposes, but only for labs that have reported enough results to obtain 5 or more z scores. For the calculation of the AAZ, z scores higher than 5 will also be set as 5. The z scores appointed to false negatives will be also included in the calculation of the combined z scores. In general, laboratories should aim to achieve AAZ scores < 0.9, which corresponds to an average bias of 22.5 %[22].

Laboratories within Category B will be typically ranked according to the total number of analytes they correctly reported to be present in the PT item. The number of acceptable z scores achieved may be presented, too.

Publication of Results

The EURLs will publish a preliminary report, containing tentative assigned values and z score values for all analytes present in the PT item, within 2 months of the deadline for result submission. An early distribution of the preliminary report, entailing preliminary assigned values (prAV), will allow an early investigation of possible errors by the participants.

The Final EUPT-Report will be published after the EUPT-SC has discussed the results. Taking into account that the EUPT-SC meets normally only once a year (typically in late summer or autumn) to discuss the results of all EUPTs organised by the EURLs earlier in the year, the Final EUPT-Report may be published up to 12 months after the deadline for results submission. Results submitted by non-EU/EFTA laboratories might not always be included in all tables or figures in the Final EUPT- Report.

Certificates of Participation

Together with the Final EUPT-Report, the EUPT organiser will deliver a Certificate of Participation to each participating laboratory showing the z scores achieved for each individual analyte, the classification into Categories, and if deemed necessary also combined z scores. The certificates of participation will be uploaded onto the EURL-DataPool and can be accessed by the concerned laboratories only.

Feedback and Complaints

Participants have the right to complain about any aspect concerning the PT (e.g. about the on-line tools used for registration and data submission, the organisation and communication with the participants, the timing of the PT, transcription errors and the result evaluation if it is not compliant with the provisions of the general protocol). Complaints about a non-arrival of a PT item or about the bad condition of the PT item upon arrival should be done through the Webtool shortly as indicated in the specific protocols. The EURLs will track the complaints and will try to accommodate all substantiated complaints in due time. After the publication of the final EUPT report, the organizers reserve the right not to consider any complaints arriving more than two months after its publication.

Appeals and complaints concerning the principles of organisation and statistical analysis of the results according to the General Protocol should be made prior to the start of a PT. By signing up to an EUPT, the participant agrees with the provisions of the General Protocol valid for the PT-season in question.

At any time before, during or after the PT participants have the possibility to contact the organisers and make improvement suggestions or indicate general errors. After the distribution of the Final EUPT-Report, participating laboratories may be given the opportunity to give their feedback to the organisers and make suggestions for future improvements through a survey.

[21] Laboratory assessment by combined z score values in proficiency tests: experience gained through the EUPT for pesticide residues in fruits and vegetables. Anal. Bioanal. Chem., 2010, 397, 3061–3070. DOI:10.1007/s00216-010-3877-3

[22] At 22,5% average bias (i.e. AAZ=0.9) and assuming a precision of 10%, the uncertainty calculates to 24.6% (error propagation formula), which is just acceptable. At a precision of 15%, the maximally tolerable average bias calculates to 20%, which translates to an AAZ of 0.8. The uncertainty of the bias was not considered in these calculations.

Correction of Errors

Should errors be discovered in any of the documents issued prior to the EUPT (Calendar, Target Pesticides List, Specific Protocol, General Protocol), the corrected documents will be uploaded onto the website and in the case of substantial errors, the participants will be informed. Before starting the exercise, participants should make sure to download and carefully study the latest version of these documents.

If substantial errors are discovered in the Preliminary EUPT-Report the organisers will distribute a new corrected version, therein it will be stated that the previous version is no longer valid. The online version on the PT website will be replaced.

Where substantial errors are discovered in the Final EUPT-Report the EUPT-SC will decide whether a corrigendum will be issued and how this should look like. The online version of the Final EUPT report will be replaced by the new one and all affected labs will be contacted.

If a new version of any EUPT document is released, each page of the new version must be marked in a way distinguishing it from previous versions, e.g. with the version number.

Where errors are discovered in EUPT-Certificates, the revised certificates will be issued and uploaded to the DataPool. The concerned laboratories will be informed and asked to download the corrected ones.

Follow-up Activities

Laboratories are expected to undertake follow-up activities to trace back the sources of erroneous or strongly deviating results (typically those with $|z| > 2.0$), including all false positives. In exceptional cases, follow-up activities may even be indicated for results within $|z| \leq 2.0$, e.g., if two errors with opposed tendency cancel each other leading to acceptable results, or where the procedure used turns out being significantly biased.

Upon request, the laboratory's corresponding NRL and EURL are to be informed of the outcome of any investigative activities for false positives, false negatives and for results with $|z| \geq 3.0$. Concerning z scores between 2.0 and 3.0 the communication of the outcome of follow-up activities is optional but highly encouraged where the source of deviation could be identified and could be of interest to other labs.

In accordance with the instructions from DG-SANTE, the "Protocol for management of underperformance in comparative testing and/or lack of collaboration of National Reference Laboratories (NRLs) with EU Reference Laboratories (EURLs) activities" is to be followed.

NRLs will be considered as underperforming in relation to scope if in at least two of the last four EUPTs falling within their responsibility area they: a) haven't participated, or b) targeted less than 90% of the compulsory analytes in the target lists (80% for SRM-compounds), or c) detected less than 90% of the compulsory compounds present in the PT items (80% for SRM-compounds). Additionally, NRLs that obtained $AZ2$ higher than 3 (AAZ higher than 1.3 for SRM-compounds) in two consecutive EUPTs of the last four EUPTs, will be considered as underperforming in accuracy. As soon as underperformance of an NRL is detected, a two-step protocol established by DG-SANTE will be applied[23]:

Phase 1:

- Identifying the origin of the bad results (failure in EUPTs).
- Actions: On the spot visits and training if necessary and repetition of the comparative test if feasible and close the assessment of results by the EURL.

Phase 2:

- If the results still reveal underperformance, the Commission shall be informed officially by the EURL including a report of the main findings and corrective actions.
- The Commission shall inform the Competent Authority and require appropriate actions to be taken.

Underperformance rules for the OfLs will be established at a later stage.

Disclaimer

The EUPT-SC retains the right to change any parts of this EUPT – General Protocol based on new scientific or technical information. Any changes will be communicated in due course.

[23] Article 101 of Regulation (EU) 2017/625

EUPT-FV26 SPECIFIC PROTOCOL

European Union Proficiency Test for
Pesticide Residues in Fruits and Vegetables
(2024)

Introduction
This protocol is complementary to the General Protocol of EU Proficiency Tests (EUPT) for Pesticide Residues in Food and Feed (11th Edition). This Proficiency Test is organised by the EURL for Pesticide Residues in Fruits and Vegetables covering Multiresidue Methods (MRM) of analysis.
According to Article 28 of Regulation 396/2005/EC (23rd February 2005) of the European Parliament and of the Council, all laboratories analysing samples for the official control of pesticide residues shall participate in the European Union Proficiency Tests (EUPTs) for pesticide residues organised by the European Union.
These proficiency tests are carried out in order to improve the quality, accuracy and comparability of the residue data and to evaluate the laboratory capacity to report results that covers the entire range of maximum residue limits (0.001 - 15 mg/kg) in all groups of fruit and vegetable matrices (high water, acid and fat content). Bearing that in mind, a wide concentration range should be covered with the different analytes present in the test item.

Proficiency testing Item
This proficiency test is based on the analysis of pesticide residues in **banana**. Organic bananas were purchased from a specialised organic market in Almería. The pesticide treatments carried out were all post-harvest using analytical standards. Bananas were milled with 1 % of ascorbic acid in order to prevent oxidation. They were spiked with the pesticides analytical standards, homogenised and packed in plastic bags. Once frozen, the material was milled again, and sub-sampled into polyethylene bottles that had previously been coded.
Ten of these bottles containing the test item were chosen randomly and analysed to check for homogeneity.
The test item was stored frozen (–20ºC) prior to shipment to participants.
A minimum of six bottles, again chosen randomly, will be analysed over a period of time to confirm the stability of the pesticides in the test item (three when the test items are shipped, then other three bottles a few days after the deadline for submitting results). There will be one further analysis during this period using three bottles more and reproducing the sample shipment to see if there is any degradation of any of the pesticides present in the PT item. If the sample shipment of EU/EFTA labs takes more than 48 hours, three extra bottles will be analysed each day of delay, studying this way the stability of the samples that took longer to arrive to an EU/EFTA laboratory.
All analytical determinations concerning the PT item treatment analysis will be performed in a laboratory which is ISO 17025 accredited, in this case, the EURL-FV laboratory.
Blank material will not be distributed to the participants.

Amount of Test Item
Participants will receive:
- Approximately 200 g of banana test item spiked with pesticides.

Shipment of PT Item
All PT Items will be frozen and packed in polystyrene boxes surrounded in dry ice and packed into cardboard boxes.
The shipment of the PT items will be carried out over a one-week period from the 26th February 2024. The Organiser will try to ensure that all the packages arrive on the same day to each laboratory. An information message will be sent out by e-mail before shipment. Laboratories must make their own arrangements for the receipt of the package. They must inform the Organiser of any public holidays in their country/city during the delivery period given in the calendar, as well as making the necessary arrangements for receiving the shipment, even if the laboratory is closed.
The Organisers will not take the responsibility for a parcel if it is retained at customs.

Advice on PT Item Handling
Once received, the PT item should be stored deeply frozen (-18°C or less) prior to analysis thus avoiding any possible deterioration/spoilage. The test item should be mixed thoroughly before taking the analytical portion(s).
All participants should use their own routine standard operating procedures for extraction, clean-up and analytical measurement and their own reference standards for identification and quantification.

Target List
Participants will be provided with two target pesticide lists, one with pesticides that have to be analysed on a compulsory basis, and a second one with pesticides to be analysed voluntarily. Those voluntary pesticides will not be used for the evaluation of the laboratories into Category A or B, and a separate statistical evaluation will be made for them.

Assigned value and robust relative standard deviation
In order to minimise the influence of out-lying results on the statistical evaluation, the assigned value will be estimated using the robust statistics as described in ANNEX C of ISO 13258:2015, where the robust mean (x*)

according algorithm A is defined. For the calculation of the assigned value only results reported by EU and EFTA countries laboratories will be taken into account.
Also, the robust relative standard deviation (CVs*) will be calculated for each analyte.

Laboratory assessment
For the assessment of the overall laboratory performance, the Average of the Squared z-Score (AZ^2) will be used, but only for those laboratories in Category A, which will be those laboratories that are able to analyse at least 90% of the pesticides in the target list, that are able to detect at least 90% of the pesticides evaluated in the test material and that report no false positives. Within Category A, the laboratories will be sub-classified as "good", "satisfactory" or "unsatisfactory". All the other laboratories will be classified in Category B. This information will be available in the General Protocol.

Steps to follow
This Proficiency Test will be made up of the following nine essential steps:

1.To participate, each laboratory must complete the Application Form on-line, which can be found on the EURL-FV Web page, before the deadline stipulated on the Calendar. It is recommended that laboratories download the Target Pesticide Lists from this web site. Laboratories should carefully read the Target Pesticide Lists, where the Minimum Required Reporting Limits (MRRLs) are given. The MRRLs do not always correspond with the EU MRLs set for banana.
2.The participation fee will be **350 euros** for EU/EFTA participants and **450 euros** for participants from other countries. The laboratories will receive an invoice and after that they can start the payment procedure. An e-mail showing the bank transfer confirmation, or similar, may be requested at any time by the Organiser. **Payments without the invoice number identifying them will not be considered as paid.**
3.Any communication with the Organisation should be made using a **Contact Form** placed in the restricted area, or by e-mail (cferrer@ual.es).
4.Laboratories will be assigned a user name and password for the restricted area of submission of results.
5.**Scope Form** will be placed in the restricted area and will be open to participants from the 13th – 26th February 2024, prior to PT item shipment. The aim is that laboratories provide information regarding their scope of analysis before receipt of the test item. As default, all compounds of the mandatory target list are selected and all compounds of the voluntary target list are deselected, and the MRRL is listed in the scope. Laboratories will be asked to indicate the compounds they have in their PT scope and insert their Reporting Limits for each pesticide. If a laboratory does not select their scope, the default values will be considered for its evaluation.
6.When the participant laboratories receive the PT item (and not before), they must enter the restricted area again and submit the **PT Item Receipt Form** to inform the Organiser that they have accepted the test item. If no PT item has been received by 1st March 2024, the laboratories should contact the Organiser. If the test item receipt form is not filled in, the Organiser will consider that the participant has accepted the PT item.
7.Once the laboratory has analysed the test item and is ready to submit their data, they must enter their results at various steps by accessing the restricted area in the EUPT webtool. The participant laboratories must respect the deadline for submitting their results – 21st March 2024 (23:30 pm at the latest) - using the tabs ***Detected, Edit results and Edit Methods*** on-line.
For each pesticide included in the laboratory scope, the Reporting Limit (RL) will be requested. This form will also request information on which of the pesticides sought by the laboratory is within the laboratory's routine scope and whether it is accredited.
All concentrations must be expressed in mg/kg together with the recovery as a percentage. The actual results/residue levels measured must be reported as numbers. **Symbols (>, <, ±, ≥, ≤, …) will not be accepted.**
IMPORTANT: If your result is not correctly expressed it will be considered as 'ND' (Not Detected).
The number of significant figures should be:
- Two, for residue levels <0.010 mg/kg (e.g. 0.0086 mg/kg).
- Three, for residue levels ≥ 0.010 mg/kg (e.g. 0.0673, 0.245, 1.32, 10.1 mg/kg).

Results should not be reported where a pesticide was not detected or was detected below the laboratory LOQ. In both cases, this will be recorded as 'ND'. If a pesticide was not sought, it will be recorded as 'NA' (Not Analysed). **If a laboratory fills in the scope form, but it does not report results neither fills in the methods form, their results will be: "No results reported".**
The laboratory will also be asked to report the details of the analytical methods they used. A list including all the pesticides detected in the sample will be shown along with a pesticide reference number. Laboratories may describe a method for the first pesticide and use this pesticide reference number to refer to other pesticides determined using the same method.
When all fields are filled out, laboratories must accept and submit their final results by clicking the check box and then click on Final submission, before 21st March 2024 (23:45 pm at the latest).
IMPORTANT: After the final submission it will NOT be possible to edit the results.
Participants will receive an email confirming the submission of their results, and with an attached excel file with their submitted data.
It should **not** be assumed that only pesticides registered for use on banana are present in the test item.
8.One final tab, ***Additional Info***, will be accessible after the deadline for submission of results has passed. In this Form it will be possible to submit the method information of false negative results. The deadline for this form will be 12th April 2024. Not all laboratories may need to fill this in. It will depend upon information reported on previous Forms.
9.The Organiser will evaluate the results at the end of the proficiency test, once the deadline for receipt of results has passed. When necessary, the Organiser will ask the participants by e-mail specific details about the methods of analysis used. A preliminary report containing the preliminary assigned values and z scores will be

sent to the participants. Finally, after evaluation by the Scientific Committee, the Final Report will be published online, and a copy will be sent to each participant laboratory. This report will include information regarding the design of the test, the homogeneity and stability results, a statistical evaluation of the participant's results as well as graphical displays of the results and any conclusions. Results submitted by non-EU/EFTA laboratories might not always be used in the tables or figures in the final report. Further relevant information considered to be of value may also be included.

Calendar

ACTIVITY	DATE
Registration period	15th December 2023 - 30th January 2024
Specific Protocol published on the Web site.	12th February 2024 at the latest
Selection of the scope	13th– 26th February 2024
Sample distribution.	26th February 2024
Deadline for receiving sample acceptance	1st March 2024
Deadline for receiving results	21st March 2024 23:30 pm
Filling in additional information, if necessary.	22nd March– 1st April 2024
Preliminary Report: (containing preliminary assigned values and z scores)	April 2024
Final Report distributed to the Laboratories.	September 2024

Cost of PT item shipment.

EU/EFTA laboratories will be charged **350 €** for the shipment cost, for **non-EU/EFTA** laboratories the amount will be **450 €**. Regarding payment procedures - each laboratory can specify their details and invoice requests when applying for the test.

Please, do not pay for this EUPT until you receive the invoice.
Remember to include your Invoice number in the subject of the bank transfer.

Payment details are as follows:

BANK NAME: CAJAMAR - Caja Rural Sociedad Corporativa de Crédito
BANK ACCOUNT HOLDER: Universidad de Almeria
BANK ADDRESS: Office Number 990. Universidad de Almeria. Spain
ACCOUNT NUMBER: ES0730580130172731005000
SWIFT: CCRIES2A

Contact information

The official organising group details are as follows:
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- Hermann Unterluggauer, AGES, Institute for Food Safety, Innsbruck, Austria.

TARGET PESTICIDE LIST FOR EUPT-FV-26

Compulsory Compounds (will be considered in Category A/B classification)

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
1	Acephate	0.01		Acephate
2	Acetamiprid	0.01		Acetamiprid
3	Aclonifen	0.01		Aclonifen
4	Acrinathrin	0.01		Acrinathrin
5	Aldicarb	0.01		Aldicarb
6	Aldicarb Sulfone	0.01		Aldicarb sulfone
7	Aldicarb Sulfoxide	0.01		Aldicarb sulfoxide
8	Aldrin	0.005		Aldrin
9	Ametoctradin	0.01		Ametoctradin
10	Azinphos-methyl	0.005		Azinphos-methyl
11	Azoxystrobin	0.01		Azoxystrobin
12	Bifenthrin	0.01	Bifenthrin (sum of isomers)	Bifenthrin
13	Biphenyl	0.01		Biphenyl
14	Bitertanol	0.01	Bitertanol (sum of isomers)	Bitertanol
15	Boscalid	0.01		Boscalid
16	Bromopropylate	0.01		Bromopropylate
17	Bromuconazole	0.01	Bromuconazole (sum of diastereoisomers)	Bromuconazole
18	Bupirimate	0.01		Bupirimate
19	Buprofezin	0.01		Buprofezin
20	Cadusafos	0.005		Cadusafos
21	Carbaryl	0.005		Carbaryl
22	Carbendazim	0.01	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim)	Carbendazim (sum)
23	Carbofuran	0.005		Carbofuran
24	Carbofuran-3-hydroxy	0.005		Carbofuran-3-hydroxy
25	Chlorantraniliprole	0.01		Chlorantraniliprole
26	Chlorfenapyr	0.01		Chlorfenapyr
27	Chlorfenvinphos	0.01		Chlorfenvinphos
28	Chlorobenzilate	0.01		Chlorobenzilate
29	Chlorothalonil	0.01		Chlorothalonil
30	Chlorpropham	0.01		Chlorpropham
31	Chlorpyrifos	0.005		Chlorpyrifos
32	Chlorpyrifos-methyl	0.005		Chlorpyrifos-methyl
33	Clofentezine	0.01		Clofentezine
34	Clothianidin	0.01		Clothianidin
35	Cyantraniliprole	0.01		Cyantraniliprole
36	Cyazofamid	0.01		Cyazofamid
37	Cyflufenamid	0.01	Cyflufenamid: sum of cyflufenamid (Z-isomer) and its E-isomer	Cyflufenamid
38	Cyflumetofen	0.01	Cyflumetofen (sum of isomers)	Cyflumetofen
39	Cyfluthrin	0.01	Cyfluthrin (cyfluthrin incl. other mixtures of constituent isomers (sum of isomers))	Cyfluthrin (sum of isomers)
40	Cymoxanil	0.01		Cymoxanil
41	Cypermethrin	0.01	Cypermethrin (cypermethrin incl. other mixtures of constituent isomers (sum of isomers))	Cypermethrin (sum of isomers)
42	Cyproconazole	0.01		Cyproconazole
43	Cyprodinil	0.01		Cyprodinil
44	Deltamethrin	0.01	Deltamethrin (cis-deltamethrin)	Deltamethrin (cis-deltamethrin)
45	Demeton-S-methylsulfone	0.005		Demeton-S-methylsulfone
46	Diazinon	0.005		Diazinon
47	Dichlofluanid	0.01		Dichlofluanid
48	Dichlorvos	0.005		Dichlorvos
49	Dicloran	0.01		Dicloran
50	Dicofol	0.01	Dicofol (sum of p, p´ and o,p´ isomers)	Dicofol (sum of p, p´ and o,p´ isomers)
51	Dieldrin	0.005		Dieldrin
52	Diethofencarb	0.01		Diethofencarb
53	Difenoconazole	0.01		Difenoconazole
54	Diflubenzuron	0.01		Diflubenzuron
55	Dimethoate	0.003		Dimethoate
56	Dimethomorph	0.01	Dimethomorph (sum of isomers)	Dimethomorph
57	Dimethylaminosulfotoluidide (DMST)	0.01		Dimethylaminosulfotoluidide (DMST)
58	Diniconazole	0.01	Diniconazole (sum of isomers)	Diniconazole
59	Diphenylamine	0.01		Diphenylamine
60	Endosulfan alpha	0.01		Endosulfan alpha
61	Endosulfan beta	0.01		Endosulfan beta

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
62	Endosulfan sulfate	0.01		Endosulfan sulfate
63	EPN	0.01		EPN
64	Epoxiconazole	0.01		Epoxiconazole
65	Ethion	0.01		Ethion
66	Ethirimol	0.01		Ethirimol
67	Ethoprophos	0.005		Ethoprophos
68	Etofenprox	0.01		Etofenprox
69	Etoxazole	0.01		Etoxazole
70	Famoxadone	0.01		Famoxadone
71	Fenamidone	0.01		Fenamidone
72	Fenamiphos	0.01		Fenamiphos
73	Fenamiphos sulfone	0.01		Fenamiphos sulfone
74	Fenamiphos sulfoxide	0.01		Fenamiphos sulfoxide
75	Fenarimol	0.01		Fenarimol
76	Fenazaquin	0.01		Fenazaquin
77	Fenbuconazole	0.005		Fenbuconazole
78	Fenhexamid	0.01		Fenhexamid
79	Fenitrothion	0.01		Fenitrothion
80	Fenoxycarb	0.01		Fenoxycarb
81	Fenpropathrin	0.01		Fenpropathrin
82	Fenpropidin	0.01		Fenpropidin
83	Fenpropimorph	0.01	Fenpropimorph (sum of isomers)	Fenpropimorph
84	Fenpyrazamine	0.01		Fenpyrazamine
85	Fenpyroximate	0.01		Fenpyroximate
86	Fenthion	0.01		Fenthion
87	Fenthion oxon	0.01		Fenthion oxon
88	Fenthion oxon sulfone	0.01		Fenthion oxon sulfone
89	Fenthion oxon sulfoxide	0.01		Fenthion oxon sulfoxide
90	Fenthion sulfone	0.01		Fenthion sulfone
91	Fenthion sulfoxide	0.01		Fenthion sulfoxide
92	Fenvalerate	0.01	Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)	Fenvalerate and Esfenvalerate (Sum of RR/SS and RS/SR isomers)
93	Fipronil	0.004		Fipronil
94	Fipronil sulfone	0.004		Fipronil-Sulfone
95	Flonicamid	0.01		Flonicamid
96	Flubendiamide	0.01		Flubendiamide
97	Fludioxonil	0.01		Fludioxonil
98	Flufenoxuron	0.01		Flufenoxuron
99	Fluopicolide	0.01		Fluopicolide
100	Fluopyram	0.01		Fluopyram
101	**Flupyradifurone**	**0.01**		**Flupyradifurone**
102	Fluquinconazole	0.01		Fluquinconazole
103	Flusilazole	0.01		Flusilazole
104	Flutolanil	0.01		Flutolanil
105	Flutriafol	0.01		Flutriafol
106	Fluxapyroxad	0.01		Fluxapyroxad
107	Formetanate	0.01	Formetanate (Sum of formetanate and its salts expressed as formetanate (hydrochloride))	Formetanate
108	Fosthiazate	0.01		Fosthiazate
109	Hexaconazole	0.01		Hexaconazole
110	Hexythiazox	0.01		Hexythiazox
111	Imazalil	0.005		Imazalil
112	Imidacloprid	0.01		Imidacloprid
113	Indoxacarb	0.01	Indoxacarb (sum of indoxacarb and its R enantiomer)	Indoxacarb (sum of isomers)
114	Iprodione	0.01		Iprodione
115	Iprovalicarb	0.01		Iprovalicarb
116	Isocarbophos	0.01		Isocarbophos
117	Isofenphos-methyl	0.01		Isofenphos-methyl
118	Isoprothiolane	0.01		Isoprothiolane
119	Kresoxim-methyl	0.01		Kresoxim-methyl
120	Lambda-Cyhalothrin	0.01	Lambda-cyhalothrin (sum of isomers)	Lambda-cyhalothrin (sum of isomers)
121	Linuron	0.01		Linuron
122	Lufenuron	0.01		Lufenuron
123	Malaoxon	0.01		Malaoxon
124	Malathion	0.01		Malathion
125	Mandipropamid	0.01		Mandipropamid
126	Mepanipyrim	0.01		Mepanipyrim
127	Metaflumizone	0.01	Metaflumizone (sum of E- and Z-isomers)	Metaflumizone (sum of E- and Z- isomers)

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
128	Metalaxyl	0.01	Metalaxyl and metalaxyl-M	Metalaxyl
129	Methamidophos	0.01		Methamidophos
130	Methidathion	0.005		Methidathion
131	Methiocarb	0.01		Methiocarb
132	Methiocarb sulfone	0.01		Methiocarb sulfone
133	Methiocarb sulfoxide	0.01		Methiocarb sulfoxide
134	Methomyl	0.01		Methomyl
135	Methoxyfenozide	0.01		Methoxyfenozide
136	Metrafenone	0.01		Metrafenone
137	Monocrotophos	0.005		Monocrotophos
138	Myclobutanyl	0.01		Myclobutanil
139	Omethoate	0.003		Omethoate
140	Orthophenylphenol	0.01	Orthophenylphenol (Free compound only), 2-phenylphenol	Orthophenylphenol
141	Oxadixyl	0.01		Oxadixyl
142	Oxamyl	0.01		Oxamyl
143	Oxydemeton-methyl	0.005	Demeton-S-Methylsulfoxide	Oxydemeton-methyl
144	Paclobutrazole	0.01		Paclobutrazol
145	Paraoxon-methyl	0.01		Paraoxon-methyl
146	Parathion	0.01	Parathion-ethyl	Parathion-ethyl
147	Parathion-methyl	0.005		Parathion-methyl
148	Penconazole	0.01		Penconazole
149	Pencycuron	0.01		Pencycuron
150	Pendimethalin	0.01		Pendimethalin
151	Permethrin	0.01	Permethrin (sum of isomers)	Permethrin (sum of isomers)
152	Phenthoate	0.01		Phenthoate
153	Phosalone	0.01		Phosalone
154	Phosmet	0.01		Phosmet
155	Phosmet oxon	0.01		Phosmet oxon
156	Phoxim	0.01		Phoxim
157	Pirimicarb	0.01		Pirimicarb
158	Pirimiphos-methyl	0.005		Pirimiphos-methyl
159	Prochloraz	0.01	Prochloraz (only parent compound)	Prochloraz
160	Procymidone	0.01		Procymidone
161	Profenofos	0.01		Profenofos
162	Propamocarb	0.01	Propamocarb (only parent compound)	Propamocarb
163	Propargite	0.01		Propargite
164	Propiconazole	0.01	Propiconazole (sum of isomers)	Propiconazole
165	Propyzamide	0.01		Propyzamide
166	Proquinazid	0.01		Proquinazid
167	Prosulfocarb	0.01		Prosulfocarb
168	Prothioconazole	0.01	Prothioconazole (Prothioconazole-desthio) (sum of isomers)	Prothioconazole-desthio
169	Prothiofos	0.01		Prothiofos
170	Pymetrozine	0.01		Pymetrozine
171	Pyraclostrobin	0.01		Pyraclostrobin
172	Pyridaben	0.01		Pyridaben
173	Pyridalyl	0.01		Pyridalyl
174	Pyrimethanil	0.01		Pyrimethanil
175	Pyriproxyfen	0.01		Pyriproxyfen
176	Quinoxyfen	0.01		Quinoxyfen
177	Spinetoram	0.01	Spinetoram (sum of spinetoram-J and spinetoram-L)	Spinetoram
178	Spinosad	0.01	Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)
179	Spirodiclofen	0.01		Spirodiclofen
180	Spiromesifen	0.01		Spiromesifen
181	Spirotetramat	0.01		Spirotetramat
182	Spirotetramat-enol	0.01		Spirotetramat, BYI 03380-enol
183	Spiroxamine	0.01	Spiroxamine (sum of isomers)	Spiroxamine
184	Sulfoxaflor	0.01	Sulfoxaflor (sum of isomers)	Sulfoxaflor
185	Tau-Fluvalinate	0.01		Tau-Fluvalinate
186	Tebuconazole	0.01		Tebuconazole
187	Tebufenozide	0.01		Tebufenozide
188	Tebufenpyrad	0.01		Tebufenpyrad
189	Teflubenzuron	0.01		Teflubenzuron
190	Tefluthrin	0.01		Tefluthrin
191	Terbuthylazine	0.005		Terbuthylazine
192	Tetraconazole	0.005		Tetraconazole
193	Tetradifon	0.01		Tetradifon
194	Thiabendazole	0.01		Thiabendazole

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
195	Thiacloprid	0.01		Thiacloprid
196	Thiamethoxam	0.01		Thiamethoxam
197	Thiodicarb	0.01		Thiodicarb
198	Thiophanate-methyl	0.01		Thiophanate-methyl
199	Tolclofos-methyl	0.01		Tolclofos-methyl
200	Tolylfluanid	0.01		Tolylfluanid
201	Triadimefon	0.01		Triadimefon
202	Triadimenol	0.01	Triadimenol (any proportion of constituent isomers)	Triadimenol
203	Triazophos	0.005		Triazophos
204	Trichlorfon	0.01		Trichlorfon
205	Tricyclazole	0.01		Tricyclazole
206	Trifloxystrobin	0.01		Trifloxystrobin
207	Triflumizole	0.01		Triflumizole
208	Triflumizole metabolite (FM-6-1)	0.01	N-(4-chloro-2-trifluoromethylphenyl)-n-propoxyacetamidine	Triflumizole, FM-6-1
209	Triflumuron	0.01		Triflumuron
210	Trifluralin	0.01		Trifluralin
211	Triticonazole	0.01		Triticonazole
212	Vinclozolin	0.01	Vinclozolin	Vinclozolin
213	Zoxamide	0.01		Zoxamide

New pesticides in the Mandatory Target list
MRRL: Minimum Required Reporting Level
This list is based on Commission Implementing Regulation (EU) EU) 2023/741 of 3 April 2023
MRRLs are based on Regulation (EC) No. 396/2005,
Regulation (EU) 2016/127 and on toxicity data of each compound.
Low MRRLs allow evaluation of pesticides at low concentration levels.

VOLUNTARY PESTICIDE LIST FOR EUPT-FV-26

Voluntary Compounds (will NOT be considered in Category A/B classification)

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
1	**1,4-Dimethylnaphthalene**	**0.01**		**1,4-Dimethylnaphthalene**
2	**4-bromophenylurea**	**0.01**	**Metabolite of metobromuron**	**4-bromophenylurea**
3	**Azadirachtin**	**0.01**		**Azadirachtin**
4	Benalaxyl	0.01	Benalaxyl including other mixtures of constituent isomers including benalaxyl-M (sum of isomers)	Benalaxyl
5	Benzovindiflupyr	0.01		Benzovindiflupyr
6	Chlorfluazuron	0.01		Chlorfluazuron
7	Clomazone	0.01		Clomazone
8	Cyhalofop-butyl	0.01		Cyhalofop-Butyl
9	Dinotefuran	0.01		Dinotefuran
10	Diuron	0.01		Diuron
11	Fenobucarb	0.01		Fenobucarb
12	Fenpicoxamid	0.01		Fenpicoxamid
13	Florpyrauxifen-benzyl	0.01		Florpyrauxifen-benzyl
14	**Fluazinam**	**0.01**		**Fluazinam**
15	Fluensulfone	0.01		Fluensulfone
16	Flufenacet	0.01	Flufenacet (only parent compound)	Flufenacet
17	Forchlorfenuron	0.01		Forchlorfenuron
18	Heptachlor	0.01		Heptachlor
19	Heptachlor epoxide, cis-	0.01	cis-Heptachlor epoxide	Heptachlorepoxid-cis
20	Heptachlor epoxide, trans-	0.01	trans-Heptachlor epoxide	Heptachlorepoxid-trans
21	Isofetamid	0.01		Isofetamid
22	Isopyrazam	0.01		Isopyrazam
23	Isoxaflutole	0.01		Isoxaflutole
24	Isoxaflutole diketonitrile degradate	0.01		Isoxaflutole, RPA 202248
25	Mefentrifluconazole	0.01		Mefentrifluconazole
26	Metaldehyde	0.01		Metaldehyde
27	**Metamitron**	**0.01**		**Metamitron**
28	**Metazachlor**	**0.01**	**Metazachlor (only parent compound)**	**Metazachlor**
29	Metconazole	0.01	Metconazole (sum of isomers)	Metconazole (sum of isomers)
30	**Metobromuron**	**0.01**		**Metobromuron**
31	Molinate	0.01		Molinate
32	Novaluron	0.01		Novaluron
33	Oxadiargyl	0.01		Oxadiargyl
34	Oxathiapiprolin	0.01		Oxathiapiprolin
35	Oxyfluorfen	0.01		Oxyfluorfen
36	Penflufen	0.01		Penflufen
37	Pentachloro-aniline	0.01		Pentachloroaniline
38	Penthiopyrad	0.01		Penthiopyrad
39	Phenmedipham	0.01		Phenmedipham
40	Picolinafen	0.01		Picolinafen
41	Propaquizafop	0.01		Propaquizafop
42	Pyrethrins	0.01	Pyrethrin (sum)	Pyrethrin (sum)
43	Pyridate	0.01	Pyridate (only parent compound)	Pyridate
44	Pyriofenone	0.01		Pyriofenone
45	Quinalphos	0.01		Quinalphos
46	Quinoclamine	0.01		Quinoclamine
47	Quintozene	0.01		Quintozene
48	Rotenone	0.01		Rotenone
49	Tetramethrin	0.01		Tetramethrin
50	Tolfenpyrad	0.01		Tolfenpyrad
51	Tri-allate	0.01		Tri-Allate
52	Tritosulfuron	0.01		Tritosulfuron

New pesticides this year

This list is based on the working document SANCO/12745/2013 rev. 15 (1)