



Organics Council®

UK Organic Food Product Basket Pesticide Survey 2018

Organics Council[®] Science Committee Report (May 2018)

1. Purpose of study:

The Organics Council[®] organic product basket annual pesticide survey 2018, is a screen of every-day organic food products for the presence of contaminating substances, such as processing aids and pesticides. It is intended to serve as a preliminary screen to assess the level of contamination across a wide range of product groups and identify where further targeted investigation is required.

2. Sample selection:

Products selected were intended to represent a typical shopping basket, containing commonly purchased day-to-day organic items. 12 products were selected based on the lowest price item available, as found at the time of the survey from across all major UK supermarkets (Ocado, Waitrose, Sainsbury's, Morrisons, Asda, Lidl, Aldi, Coop, Iceland and M&S). Products included in the Organics Council[®] organic product basket annual pesticide survey 2018 were:

1. SO Organic Honey 340g
2. SO Organic Sunflower oil 1L
3. Tesco Organic Onions 0.75kg
4. Duchy Organic Farmhouse Batch Wholemeal Bread 0.8kg
5. Ocado Organic White Potatoes 2kg
6. Duchy Organic Carrots 1kg
7. Wholegood Organic Oranges 1.8kg
8. SO Organic Bananas 1kg
9. SO Organic 6 Royal Gala Apples
10. Tesco Organic Plain Flour 1kg
11. Whole Earth Golden Organic Corn Flakes 375g
12. Ocado Organic Eggs box of 12

3. Screening tests performed:

Samples were sent to Minerva (part of the Tentamus Group Lab Network), an ISO 17025 accredited lab which performed product testing using accredited methods, ensuring accuracy and validity, including:

- a. Tentamus PV-SA-085 method for multi-residue pesticide screening, using the Combi-method (combined procedure from the methods DFG S19 and QuEChERS) with detection by LC-MS/MS and/ or HPLC.
- b. Glyphosate, Glufosinat and AMPA screening, using the PV-SA-118 method (LC-MS/MS)

4. Results:

4.1. Cypermethrin detected in 'SO Organic Sunflower oil':

Cypermethrin and its isomers were detected at trace levels between 0.002-0.005 mg/kg, in 'SO Organic Sunflower oil' (sold by Sainsbury's), by both LC and GC-MSMS. Using these methods, a lowest limit of detection (LoD) is 0.002mg/kg, therefore we know the concentration was above this. However, the concentration could not be accurately quantified, therefore it was below the lowest limit of quantification (LoQ) of 0.005mg/kg. Therefore, we know the concentration was between these two values.

The levels of cypermethrin detected were below the general default EU pesticide MRL of 0.01 mg/kg in food products [18]. This broad-spectrum pyrethrin insecticide is not approved for use in Organic farming, so should not be detectable in organic goods. However, cypermethrin is still approved in conventional farming.

Reported hazards include:

- a. EFSA assessed the toxicity of cypermethrin, establishing an ADI of 0.05 mg/kg bw/day [2], while USEPA established a chronic oral reference dose of 0.01 mg/kg/day [19].
- b. Cypermethrin is a mixture of isomers and one of its isomers alpha-cypermethrin has higher toxicity than cypermethrin (ADI of 0.015 mg/kg bw/d according to EFSA) [3]. The EU has banned beta-cypermethrin from use entirely, however the use of cypermethrin, alpha-cypermethrin and zeta-cypermethrin continues to be permitted in the EU [2,3,4,5].
- c. Reported toxicity of cypermethrin and alpha-cypermethrin include [2,3,6,7]:
 - i. Oral intake hazards: Alpha cypermethrin presents a H301 hazard - Acute toxicity if swallowed, while cypermethrin presents a lower H302 hazard, being only harmful if swallowed.
 - ii. H373 - Alpha-cypermethrin causes damage to organs through prolonged or repeated exposure
 - iii. Literature reported effects of exposure to isomer mixtures: Potential carcinogenicity, developmental effects, genotoxicity and endocrine disruption
 - iv. Cypermethrin and alpha-cypermethrin present a direct contact risk of H332 - Harmful if inhaled and H335 - single inhalation exposure can cause respiratory tract irritation
 - v. Cypermethrin and alpha-cypermethrin environmental release risks: H400 / H410 - Very toxic to aquatic life with acute exposure and long lasting effects. Note that aquatic species are used as environmental impact indicator species for environmental hazard classifications and this does not mean that other environmental habitats are not at risk.

4.2. Glyphosate detected in wheat products (bread and flour)

Glyphosate, is a commonly used broad spectrum herbicide, that was detected at trace levels in two out of three organic grain and cereal products tested (Duchy Organic Farmhouse Batch wholemeal bread from Waitrose and Tesco Organic Plain Flour), by LC-MS/MS. The lowest limit of detection (LoD) available with this method was 0.003 mg/kg, therefore we know the concentration was above this. However, the concentration could not be accurately quantified, as it was below the lowest limit of quantification (LoQ) of 0.01mg/kg. Therefore, we know the concentration was between these two values.

Glyphosate is still approved for use in conventional EU farming regulations despite the major controversy regarding the reported safety of glyphosate and its metabolites. In fact, the EU has allowed for an increased MRL for glyphosate in conventionally farmed wheat products of 10 mg/kg [11]. However, a significant body of research exists on the risks of both acute and long-term consumption of glyphosate contaminated goods.

Reported hazards include:

- a. Glyphosate was classified as 'probably carcinogenic to humans' by the International Agency for Research on Cancer (IARC) in March 2015 [8].
- b. EFSA established an ADI of 0.5 mg/kg/day [9], while USEPA established a chronic oral RfD of 0.1 mg/kg/day [20].
- c. Reported toxicity includes [10, 12, 13].
 - i. Literature reported risks: Carcinogenicity, endocrine disruption effects and reproductive defects in a range of species,
 - ii. Direct contact: H318: Causes serious eye damage and H335: May cause respiratory irritation with single exposure.
 - iii. Environmental release: H400 / H410: Very toxic to aquatic life with acute exposure and long lasting effects, showing it as a persistent and long-term hazard. Note that aquatic species are used as environmental impact indicator species for environmental hazard classifications.

4.3. Cyromazine detected in organic eggs

Cyromazine is a triazine insect growth regulator (IGR) and was detected at a concentration of 0.13 mg/kg in a homogenized sample of a box of 12 'Ocado Organic Eggs' from Ocado.

While cyromazine is not approved for use in organic farming, it may be applied in conventional farming. However, cyromazine detection at 0.13 mg/kg, exceeds the maximum permitted pesticide residue level of 0.01 mg/kg in the EU for bird eggs, meaning that the product does not meet EU regulatory requirements for food safety and is not of a legally marketable quality, even if the eggs were not classed as organic [17].

- a. EU established an ADI of 0.06 mg/kg/day [16], while a chronic RfD of 0.0075 mg/kg/day has been established by the USEPA [21].
- b. The EPA classified cyromazine as a group "E" carcinogen where no evidence of carcinogenicity in humans exists, however it has been shown in animal models [15].
- c. Reported toxicity include :
 - i. Literature reported effects: Melamine a metabolite of cyromazine has known carcinogenic effects in humans and animals, animal models have shown developmental or reproductive disruption and carcinogenicity [15].
 - ii. Direct contact: H315: Causes skin irritation, H319: Causes serious eye irritation and H335: May cause respiratory irritation with single exposure
 - iii. Environmental release: H411: Toxic to aquatic life with long lasting effects. Note that aquatic species are used as environmental impact indicator species for environmental hazard classifications.

5. Conclusions:

The detection of these pesticides in this screening study, is not intended to be reported as indicating widespread use of non-approved synthetic pesticides by the organic food industry. However, this does provide us with guidance as to how widespread and serious the level of contamination of our day-to-day food products are and as to where future analysis should be focussed.

Assuming that none of these contamination events were the result of the deliberate organic farming malpractice, these findings do raise significant questions about the effectiveness of current methods used to separate and segregate organic and conventional farming environments (such as boundary zones) and production facilities, to ensure that contamination such as this does not occur.

While in all cases, the detection of these contaminating pesticide residues may be expected in conventional food (within the defined MRL limits), the contamination of organic food with glyphosate, cyromazine and cypermethrin is unacceptable. This also highlights that consumers are regularly co-exposed to multiple contaminating substances via their daily diet. The risks of co-exposure to harmful substances, can be very serious and more work should be done to include co-exposure and pesticide combinations into regulatory pesticide safety assessments, as a realistic assessment of the human daily exposure to these harmful substances.

The identification of hazard to aquatic life for all three detected pesticides is of serious concern. Note that aquatic species are used as environmental impact indicator species for environmental hazard classifications. The environmental impact of the widespread use of broad spectrum pesticides is concerning, with reported effects on a wide number of species including pollinators such as the honey

bee. Considering the long-term effects, this is likely to have an adverse effect on the natural environment for some time to come.

Finally, cyromazine residue detection at 0.13 mg/kg, is in exceedance of the defined MRL for bird eggs in the EU and is of serious concern, rendering this item not of legally marketable quality.

References:

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Annex I. Cypermethrin laboratory report data

Overview of the examined pesticides by the Combi-method
(combined procedure from the methods DFG S19 and QuEChERS)
Effective: 07.12.2017

pesticides	Reporting limit [mg/kg]	Limit of Quantification [mg/kg]	Detection limit [mg/kg]	GC		LC		CAS-Nr.	Hydrolysis required after detection in screening
				NCI/ECD	MS/MS	(+)	(-)		
Cypermethrin	0,01	0,005	0,002		X	X		52315-07-8	

Sample Description: Oil
Sample Reference: 1.4
Lab Number: FS10034734
Date Received: 13/04/2018
Date of Issue: 26/04/2018

Issue: 1

Test Description	Method Ref	Result	Reporting Limit	Units
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Subcontracted Tests

Pesticide Residues

Pesticide Multi-Residue Screen	RES16.S	Reference Certificate 18/037816	NA	-
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Comments

The test results relate only to the sample supplied.
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Tests marked with the suffix .S are not included in the UKAS Accreditation schedule for this Laboratory and have been sub-contracted to another Laboratory.

Package: plastic bottle, screw cap, label
Sampling: by client, sample entry by delivery service
Temperature of receipt: + 19,4 °C
Begin of examination: 17.04.2018
End of examination: 25.04.2018

Examination of pesticides

Parameters	Result	Reference	Unit	LoQ	Method
Pesticides according to DFG S19 (1)	not detected				PV-SA-085(GC)
Pesticides according to LC-MS-MS-Screening					PV-SA-085(LC)
Cypermethrin	<LoQ		mg/kg	0,010	
Cypermethrin (cypermethrin including other mixtures of constituent isomers (sum of isomers))	<LoQ	0,05 {MRL}	mg/kg	0,010	

{G}Limit, {R}Standard, {S}Specification value, {T}Tolerance value, {W}Warning value, {PV}Testing method, {m}modified, {HM}Maximum residue level

LoQ = Limit of quantification

(1) Overview of the examined pesticides after the Combi-method (PV-SA-085), state 19.02.2018
PV-SA-085: combined procedure from the methods DFG S19 and QuEChERS with the detection modules LC-MS/MS and GC-MSD
{MRL} = maximum residue level

Conclusion

Within the scope of analysis the product meets the demands of the EU Regulation concerning the maximum residues levels for pesticides in or on food and is marketable [1,2].

ppa. Karsten Ott
Manager Dep. Instrumental Analytics

References:

- [1] Collection of texts on food law in the most current version, publisher C. H. Beck
- [2] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC

Annex II. Glyphosate laboratory report data

Sample Description: Flour
Sample Reference: 1.16
Lab Number: FS10034739
Date Received: 13/04/2018 **Issue: 1**
Date of Issue: 26/04/2018

Test Description	Method Ref	Result	Reporting Limit	Units
Subcontracted Tests				
Pesticide Residues				
Pesticide Multi-Residue Screen	RES16.S	Reference Certificate 18/037821	NA	-

Comments

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Conclusion

Within the scope of analysis the product meets the demands of the EU Regulation concerning the maximum residues levels for pesticides in or on food and is marketable [1,2].

ppa. Karsten Ott
Manager Dep. Instrumental Analytics

References:

[1] Collection of texts on food law in the most current version, publisher C. H. Beck

[2] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC

Sample number: 18/037821
Client: Minerva Scientific Ltd
 Minerva House, Unit 2, Stoney Gate Road
 UK-DE21 7RY Spondon, Derby
Date of Entrance: 17.04.2018
Samplename: FS10034739 Flour
Customer Sample No.: MIN-002698
Quantity: ca. 440 g
Content: 1
Package: foil bag, label
Sampling: by client, sample entry by delivery service
Begin of examination: 17.04.2018
End of examination: 20.04.2018



Chemical - physical examination

Parameters	Result	Reference	Unit	LoQ	Method
Glyphosate	<LoQ	10,00 {HG}	mg/kg	0,010	PV-SA-118 (LC-MS/MS)
AMPA	not detected		mg/kg	0,010	PV-SA-118 (LC-MS/MS)
Glufosinat	not detected	0,03 {HG}	mg/kg	0,010	PV-SA-118 (LC-MS/MS)

{G}Limit, {R}Standard, {S}Specification value, {T}Tolerance value, {W}Warning value, {PV}Testing method, {m}modified, {HM}Maximum residue level
 LoQ = Limit of quantification

Sample Description: Bread
Sample Reference: 1.14
Lab Number: FS10034737
Date Received: 13/04/2018
Date of Issue: 26/04/2018

Issue: 1

Test Description	Method Ref	Result	Reporting Limit	Units
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Subcontracted Tests

Pesticide Residues

Pesticide Multi-Residue Screen	RES16.S	Reference Certificate 18/037819	NA	-
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Comments

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Sample number: 18/037819
Client: Minerva Scientific Ltd
 Minerva House, Unit 2, Stoney Gate Road
 UK-DE21 7RY Spondon, Derby
Date of Entrance: 17.04.2018
Samplename: FS10034737 Bread
Customer Sample No.: MIN-002698
Quantity: ca. 293 g
Content: 1
Package: foil bag, label
Sampling: by client, sample entry by delivery service
Begin of examination: 17.04.2018
End of examination: 20.04.2018



Chemical - physical examination

Parameters	Result	Reference	Unit	LoQ	Method
Glyphosate	<LoQ	10,00 {HG}	mg/kg	0,010	PV-SA-118 (LC-MS/MS)
AMPA	not detected		mg/kg	0,010	PV-SA-118 (LC-MS/MS)
Glufosinat	not detected	0,03 {HG}	mg/kg	0,010	PV-SA-118 (LC-MS/MS)

{G}Limit, {R}Standard, {S}Specification value, {T}Tolerance value, {W}Warning value, {PV}Testing method, {m}modified, {HM}Maximum residue level

LoQ = Limit of quantification

Conclusion

Within the scope of analysis the product meets the demands of the EU Regulation concerning the maximum residues levels for pesticides in or on food and is marketable [1,2].

ppa. Karsten Ott
 Manager Dep. Instrumental Analytics

References:

- [1] Collection of texts on food law in the most current version, publisher C. H. Beck
- [2] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC

Annex III: Cyromazine laboratory report data

Sample Description: Eggs
Sample Reference: 1.2
Lab Number: FS10034732
Date Received: 13/04/2018 **Issue: 1**
Date of Issue: 26/04/2018

Test Description	Method Ref	Result	Reporting Limit	Units
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Subcontracted Tests

Pesticide Residues

Pesticide Multi-Residue Screen	RES16.S	Reference Certificate 18/037814	NA	-
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Comments

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Jay Madden
BSc
Director



Sample number: 18/037814
Client: Minerva Scientific Ltd
 Minerva House, Unit 2, Stoney Gate Road
 UK-DE21 7RY Spondon, Derby
Date of Entrance: 17.04.2018
Samplename: FS10034732 Eggs
Customer Sample No.: MIN-002697
Quantity: 9 Stück
Package: envelope, nup foil
Sampling: by client, sample entry by delivery service
Temperature of receipt: + 19,4 °C
Begin of examination: 17.04.2018
End of examination: 25.04.2018

Examination of pesticides

Parameters	Result	Reference	Unit	LoQ	Method
Pesticides according to DFG S19 (1)	not detected				PV-SA-085(GC)
Pesticides according to LC-MS-MS-Screening					PV-SA-085(LC)
Cyromazine	0,13	0,01 {MRL}	mg/kg	0,010	

{G}Limit, {R}Standard, {S}Specification value, {T}Tolerance value, {W}Warning value, {PV}Testing method, {m}modified, {HM}Maximum residue level

LoQ = Limit of quantification

(1) Overview of the examined pesticides after the Combi-method (PV-SA-085), state 19.02.2018
 PV-SA-085: combined procedure from the methods DFG S19 and QuEChERS with the detection modules LC-MS/MS and GC-MSD
 {MRL} = maximum residue level

Conclusion

The examined sample contains Cyromazin at a concentration of 0,13 mg/kg, which exceeds the maximum residue level of 0,01 mg/kg. This maximum limit is exceeded even in consideration of an expanded analytical measurement uncertainty of 50 %*.

Therefore, within the scope of analysis and in consideration of an expanded analytical measurement uncertainty the product does not meet the demands of the EU Regulation concerning the maximum residue levels for pesticides in or on food and is not marketable [1,2].

ppa. Karsten Orr
 Manager Dep. Instrumental Analytics

* Recommendation of Codex Committee in order to assess the measurement uncertainty by pesticide residues analysis (Document N°SANTE/11945/2015 from 01.12.2015).

References:

- [1] Collection of texts on food law in the most current version, publisher house C. H. Beck
 [2] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC