

Residue Findings of QuPPE-Compounds in Samples of Plant Origin from the German Market in 2020

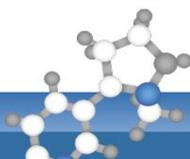
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The aim of this compilation is to give an overview as to which highly polar (QuPPE-) compounds are currently encountered in food products of plant origin. This should help other institutions when it comes to taking decisions on how to expand the scope of analytes, on how to plan the sampling and on which QuPPE compounds to target in certain types of samples.

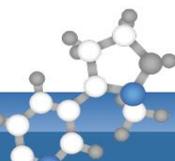
At CVUA Stuttgart, 42 QuPPE-compounds were routinely monitored in 2020 (see Table 1).

Table 1: Scope of QuPPE-compounds that were routinely monitored by the CVUA Stuttgart in 2020

Compound	Notes on legal limits	General notes
Ammelide	Non-regulated metabolite and contaminant	Ammelide can have various sources similar to ammeline. Melamine (see sources below) converts to cyanuric with ammelide (and ammeline) being formed as intermediates. Also reported as metabolite of triazine pesticides incl.: cyromazine (insecticide), anilazine (fungicide), terbuthylazine, prometryn, simazine, atrazine, ametrin, cyanazine (all herbicides). Among those, only terbuthylazine is currently approved within the EU.
Ammeline	Non-regulated metabolite and contaminant	Intermediate in the conversion of melamine to cyanuric acid. More info see Ammelide.
Amitrole		Herbicide, the most important of the very few triazole pesticides with herbicidal properties. Approval expired in mid 2016.
Bialaphos	Not specifically regulated, MRL of 0.01 mg/kg applies	Herbicide (transforms to glufosinate). Not listed in the EU active substances database.
Bromide		Reaction product of fumigant methylbromide. Also originating from irrigation water and soil. Counter ion of certain quarternary ammonium compounds e.g. benzalkonium, Didecyl Dimethyl Ammonium (DDA-), diquat and paraquat
Chlorate	New MRLs set in 2020	Formerly used as herbicide, but nowadays mainly originating from chlorinated water used for irrigation or chlorinated water use to wash products and processing/storage equipment.
Chloridazon-desphenyl	Regulated metabolite	Metabolite of chloridazon. Chloridazone approval expired 31/12/2018
Chlormequat		Growth regulator
Cyanuric acid	Non-regulated metabolite	Compound originating from multiple sources, e.g.: Triazine pesticides (incl. the herbicides terbuthylazine, atrazine, cyanazine, the fungicide; anilazine and the insecticide cyromazine). From the above only terbuthylazine and cyromazine are currently in use within the EU, with the latter having lost approval. Cyanamide-based fertilizers. Cyanamide contained in fertilizers may convert to melamine through trimerization, which can further hydrolyze to cyanuric acid. Urea-based fertilizers or feed: especially at high temperatures urea loses ammonia converting to isocyanic acid (HNCO), which trimerizes to cyanuric acid. Mono-, Di- and Trichloroisocyanurates: Used as disinfectants, algacides and bactericides. They are used in sanitation liquids and bleaching agents as well as in swimming pools (pool-tabs) to retard the loss of chlorine in chlorinated water. In water, they gradually convert to cyanuric acid. Natural formation of cyanuric acid has also been reported (e.g. in humus).
Cyromazine		Fungicide (EU-approval expired in Dec. 2019). Also used as an ectoparasiticide (e.g. on sheep, but not on lactating sheep) and as a biocide on manure against fly larvae
Daminozide		Approved growth regulator
Difenzoquat	Not specifically regulated, MRL of 0.01 mg/kg applies	Herbicide
Dimethoate-O-desmethyl	Non-regulated metabolite	Also known as Metabolite X
Ethephon		Growth regulator



Compound	Notes on legal limits	General notes
HEPA	Non-regulated metabolite	Metabolite of ethephon. Natural formation by bacteria under anaerobic conditions was reported. Detected by the EURL-SRM in all analyzed samples of bovine liver (levels around 0.5 mg/kg)
ETU	Non-regulated degradant	Degradant of ethylen-bis-dithiocarbamates. Mainly formed during processing.
Fosetyl		Approved fungicide (converts to phosphonic acid, which is the active component)
Phosphonic acid	Regulated with parent fosetyl	Approved Fungicide, used as such and also formed as a metabolite of fosetyl
Glufosinate		Herbicide, approval expired in mid-2018 and not renewed
MPP (MPPA)	Included in residue definition of glufosinate	Metabolite of glufosinate
N-Acetyl Glufosinate	Included in residue definition of glufosinate	Metabolite of glufosinate
Glyphosate		Herbicide
AMPA	Non-regulated metabolite.	Metabolite of glyphosate. Planned inclusion in RD of glyphosate.
N-Acetyl-Glyphosate	Non-regulated metabolite.	Metabolite of glyphosate. Planned inclusion in RD of glyphosate.
N-Acetyl-AMPA	Non-regulated metabolite.	Metabolite of glyphosate
Maleic hydrazide		Approved sprouting inhibitor; Plant product MRLs set at 0.2* / 0.5* except for Potatoes, Carrots, Parsnips, Onions, Garlic, Shallots, Chicory
Matrine	Not approved. MRL of 0.01 mg/kg applies	Natural alkaloid, and classified as biopesticide in China. Contained in various plants of the genus Sophora. Cases of illegal addition of sophora root extracts in fertilizers in Italy. Sophora extracts also used in medical and cosmetics field. Anticancer properties reported.
Oxymatrine	Not listed	Alkaloid present in Sophora extracts
Melamine	Regulated by Reg. 1881/2006/EC as a contaminant	Metabolite of cyromazine (pesticide and vet. drug. May also originate from cyanamide fertilizers (trimerization of cyanamide). It may also originate from urea, where it is formed through trimerisation and elimination of ammonia and carbon dioxide, next to the non-cyclic dimer (biuret) and trimer (triuuret). Melamine hydrolyzes to cyanuric acid via ammeline and ammelide. Melamine is widely used in the synthesis of melamine-formaldehyde resins used in synthetic surfaces of furniture and textiles, kitchenware, moulding, packaging materials. Also used as a fire-retardant.
Mepiquat		Growth regulator
Mepiquat, 4-Hydroxy	Non-regulated metabolite	Metabolite of mepiquat, mainly relevant for food of animal origin
Morpholine	Not regulated as a pesticide	Additive of waxes (typically added in a 1:1 Mixture with oleic acid) to assist emulsification in water.
Nereistoxin	Non-regulated metabolite	Transformation product of various members of the nereistoxin pesticides family, such as bensultap, cartap and thiocyclam
Nicotine*	MRLs set for rose hips, herbs and edible flowers, wild fungi, teas, herbal infusions and spices	Insecticide, contaminant from tobacco through air, soil and human contact.
Perchlorate	Regulated as a contaminant Contaminant Reg. (EC) 1881/2006/EC	Persistent and ubiquitous environmental contaminant. Mainly originating from fertilizers, may be also formed as a byproduct of disinfection of drinking water. Temporarily inhibits the intake of iodine in the thyroid gland.
Propamocarb	Approved	Fungicide, mainly relevant for vegetables, e.g. root, bulb, fruiting, leafy vegetables
Propamocarb N-desmethyl	Non regulated metabolite	Metabolite of propamocarb
Propamocarb-N-oxide	Non regulated metabolite	Metabolite of propamocarb
PTU	Regulated in infant- and baby food Reg. EC 125/2006 and 141/2006	Degradant of propineb. Mainly formed during processing.
Pymetrozine, 6-hydroxymethyl	Non-regulated metabolite	Metabolite of pymetrozine
Thiocyanate	No specific MRLs set, formally 0.01 mg/kg applies currently	Non-approved active substance (fungicide). Also naturally formed in various cultivated plants of the brassica and allium family. Temporarily inhibits the intake of iodine in the thyroid gland.
Trimesium		Counter-ion of glyphosate, also naturally formed during the drying process of food



Residue Findings:

In 2020, a total of 2108 samples, mainly fruit and vegetables, but also cereals, pulses, processed goods, tea and others, were analyzed for QuPPE-amenable compounds at the CVUA Stuttgart. 1621 samples (77 %) contained quantifiable residues of one or more of the tested QuPPE compounds. Table 2 shows a compilation of the results. *Cyanuric acid, phosphonic acid, perchlorate, chlorate and melamine* exceeded the respective reporting limits in **> 10 % of the samples**.

Thiocyanate, propamocarb, trimesium, propamocarb-N-oxide, bromide, nicotine, ethephon metabolite HEPA, ammelide, dimethoate-O-desmethyl, propamocarb-N-desmethyl, glyphosate and chlormequat exceeded the respective reporting limits in **1 - 10 % of the samples**.

Chloridazon-desphenyl, maleic hydrazide, cyromazine, glufosinate met. MPPA, fosetyl/phosphonic acid, nereistoxin, morpholine, matrine, PTU, 4-hydroxy mepiquat, ETU, glufosinate, amitrole exceeded the respective reporting limits in **0.1 -1% of the samples**.

The following compounds could not be detected or did not exceed their respective reporting limits: *Ammeline, bialaphos, daminozide, difenzoquat, N-acetyl-AMPA, N-acetyl-glufosinate, N-acetyl-glyphosate, oxymatrine and pymetrozine-6-hydroxymethyl*.

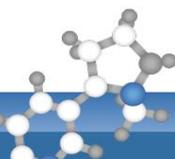
Table 2: Residue findings of QuPPE-compounds (CVUA Stuttgart 2020)

Compound	# samples	# pos.	% pos.	Max (mg/kg)	Mean ¹⁾ (mg/kg)	Median ¹⁾ (mg/kg)	# >MRL ²⁾	% >MRL	RL ³⁾
Cyanuric acid	2105	751	36	10.8	0.062	0.012			0.005
Phosphonic acid	2105	507	24	587	5.8	0.89	10	0.5	0.05
Perchlorate	2105	370	18	1.8	0.045	0.014	5	0.2	0.005
Chlorate	2105	329	16	5.5	0.062	0.011	5	0.2	0.005
Melamine	2109	236	11	2.5	0.113	0.033			0.005
Thiocyanate	2104	182	8.7	964	21.4	3.6			
Propamocarb	2108	101	4.8	3.5	0.15	0.041	1	0.05	0.005
Trimesium	2108	67	3.2	1.5	0.13	0.033	18	0.9	0.005
Propamocarb-N-oxide	2108	66	3.1	0.28	0.036	0.014			0.005
Bromide	2105	57	2.7	74.2	22	15.8	4	0.2	5
Nicotine	796	50	6.3	1.9	0.10	0.029	19	2.4	0.005
Ethephon metabolite HEPA	2104	46	2.2	10.4	0.60	0.093			0.005
Ammelide	1880	46	2.4	0.15	0.030	0.018			
Dimethoate-O-desmethyl	2104	43	2	0.33	0.050	0.023			
Propamocarb-N-desmethyl	2108	37	1.8	0.14	0.022	0.009			0.005
Glyphosate	2063	29	1.4	13.1	0.74	0.20	2	0.1	0.02
Chlormequat chloride	2109	29	1.4	1.5	0.15	0.036	5	0.2	0.005
Ethephon	2104	22	1	0.8	0.18	0.093	1	0.05	0.02
Mepiquat	2108	21	1	0.071	0.017	0.009			0.005
Chloridazon-desphenyl	2108	18	0.9	0.13	0.019	0.008			0.01
Maleic hydrazide	2104	10	0.5	11.5	4.1	3.2			0.01
Cyromazine	2108	9	0.4	1.1	0.27	0.052	1	0.05	0.01
Glufosinate met. MPPA	2104	7	0.3	0.1	0.041	0.033	1	0.05	0.01
Fosetyl	2105	6	0.3	1.1	0.46	0.31			0.01
Nereistoxin	2108	3	0.1	0.45	0.16	0.016			0.005
Morpholine	2109	3	0.1	20.1	13.3	18.7			
Matrine	663	3	0.5	0.17	0.058	0.002	1	0.2	
PTU	2108	2	0.09	0.019	0.012	0.012			0.02
Mepiquat, 4-hydroxy	2108	2	0.09	0.066	0.037	0.037			0.005
ETU	2108	2	0.09	0.26	0.18	0.18			0.02
Glufosinate	2104	1	0.05	0.36			1	0.05	
Amitrole	2108	1	0.05	0.01					

¹⁾ Mean and median of positives

²⁾ Numerical MRL-exceedances

³⁾ RL= Reporting Limit (exemplary for fruits and vegetables)



MRL exceedances

In 76 samples MRLs for different compounds were exceeded. Table 3 gives an overview of these exceedances.

Table 3: Samples with residues of QuPpe-compounds exceeding existing MRLs* (CVUA Stuttgart 2020)

Compound	Commodity	Country of Origin	Conc. (mg/kg)	>2x MRL**	Note
Bromide	Brazil nut	Unknown	74.2		
	Poppy seed	Unknown	27.9		
	Sesame	India	27.9		organic
	Sesame	India	31.8		organic
Chlorate <i>(herbicide, but chlorinated water used in irrigation or sanitation mostly responsible for levels found in food)</i>	Chia seeds	Unknown	0.26	X	organic
	Sesame	Unknown	5.5	X	
	Nectarine	Spain	0.060		
	Strawberry	Spain	0.086		
	Tomato	Belgium	0.45	X	
Chlormequat chloride	Chili powder	Unknown	0.31	X	
	Chili powder	Unknown	0.18		
	Strawberry, frozen	Unknown	0.030	X	
	Paprika powder	Unknown	0.52	X	
	Paprika powder	Unknown	0.45	X	
Cyromazine	Spring onion	Egypt	0.052		
Ethephon	Bell pepper	Hungary	0.089		
Fosetyl, sum <i>(phosphonic acid was the only detected compound in most cases)</i>	Flour	Unknown	5.1	X	
	Poppy seed	Unknown	166	X	
	Papaya	Brazil	3.8		
	Papaya	Brazil	5.5	X	
	Passion fruit	South Africa	5.8	X	
	Pomegranate	Turkey	3.4		
	Garlic	China	3.0		
	Garlic	Germany	5.8	X	
	Ginger	Peru	2.2		
	Green beans	Egypt	3.0		
	Green beans	Egypt	8.6	X	
	Green beans	Egypt	10.7	X	
	Glufosinate Met. MPP	Mandarine	South Africa	0.10	
Glyphosate	Potato	Israel	0.36		
	Spices	Unknown	0.44	X	
	Zucchini	Germany	13.1	X	
Matrine	Chili peppers	Turkey	0.17	X	
Nicotine <i>(acaricide, but tobacco-related contamination mostly responsible for levels found in food)</i>	Bean	China	0.036	X	organic
	Sesame	India	0.011		
	Sesame	India	0.016		
	Sesame	India	0.023	X	
	Sesame	Unknown	0.046	X	
	Mandarine	Spain	0.032	X	
	Raspberry	Germany	0.013		
	Oyster mushroom	Poland	0.012		
	Leafy vegetables, dried	Germany	0.19	X	
	Wine leaves, prepared in brine	Unknown	0.038	X	
	Borecole	Germany	0.014		organic
	Lambs lettuce	Belgium	0.021	X	
	Lambs lettuce	Germany	0.015		
	Lambs lettuce	Germany	0.018		
	Lambs lettuce	Germany	0.023	X	
	Lambs lettuce	Germany	0.062	X	
	Leek	Germany	0.017		
	Rucola	Germany	0.022	X	
	Rucola	Italien	0.012		

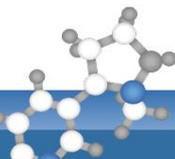
Compound	Commodity	Country of Origin	Conc. (mg/kg)	>2x MRL**	Note
Perchlorate <i>(contaminant in fertilizers)</i>	Brazil nut	Unknown	0.12	X	
	Brazil nut	Unknown	0.15	X	
	Brazil nut	Unknown	0.23	X	
	Brazil nut	Unknown	0.26	X	
	Pak choi	Germany	0.13	X	
Propamocarb	Wine leaves, prepared in brine	Egypt	0.039	X	
Trimesium <i>(Counter ion of glyphosate but also natural formation during drying process of crops)</i>	White button mushroom	Germany	0.061		
	Black tea	India	0.13	X	
	Black tea	Sri Lanka	0.13	X	organic
	Black tea	Sri Lanka	0.084		
	Black tea	Sri Lanka	0.096		
	Black tea	Sri Lanka	0.098		
	Black tea	Sri Lanka	0.12	X	
	Black tea	Sri Lanka	0.2	X	
	Green tee	Japan	0.13	X	organic
	Herbal tea	Unknown	0.13	X	
	Broccoli powder	Germany	0.66		organic
	Beetroot powder	Germany	0.81	X	organic
	Beetroot powder	European Union	0.59		organic
	Beetroot powder	Kenia	0.13	X	organic
	Rose hip powder	Unknown	0.38		organic
	Rose hip powder	Unknown	0.68		organic
	Beetroot powder	Unknown	1.11	X	organic
	Moringa powder	Unknown	1.46	X	organic

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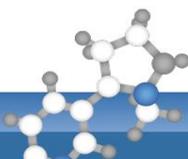
** >2xMRL means that the sample exceeded MRL even after deducting measurement uncertainty of 50%

Table 4: Top 15 residue levels of most frequently found QuPPE-compounds (with > 50 findings in total)

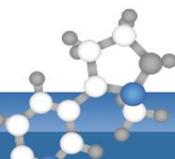
Compound	Commodity	Country of origin	Residue level (mg/kg)
Cyanuric acid <i>(non-regulated pesticide metabolite and contaminant in fertilizers)</i>	Avocado	Unknown	10.8
	Food supplement, spirulina	Germany	2.0
	Food supplement, spirulina	Germany	1.6
	Pomegranate	Israel	1.4
	Oyster mushroom	Poland	1.1
	Radish, small ~	Germany	1.0
	Paprika powder	Unknown	0.82
	Thyme, dried	Unknown	0.65
	Potato	Germany	0.61
	Pineapple	Costa Rica	0.60
	Pineapple	Costa Rica	0.58
	Pineapple	Costa Rica	0.58
	Parsley, dried	Unknown	0.57
	Prickly pear	Italy	0.56
	Garlic	China	0.53
Phosphonic acid <i>(Metabolite of Fosetyl) but also used as such. Shows high persistence in plants, and residues in crops of perennial plants may originate from previous seasons)</i>	Beer ingredients. hops	Unknown	587
	Beer ingredients. hops	Unknown	159
	Beer ingredients. hops	Germany	146
	Poppy seed	Unknown	123
	Beer ingredients. hops	Germany	119
	Blackberry	Germany	75.9
	Haselnut, ground	Unknown	58.1
	Raspberry	Germany	51.3
	Blackberry	Germany	50.6
	Avocado	South Africa	47.2
	Strawberry	Germany	43.7
	Rucola	Germany	36.3
	Apple	Chile	34.0
	Chicory	Germany	31.7
	Pear	Italy	30.9



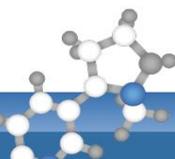
Compound	Commodity	Country of origin	Residue level (mg/kg)
Perchlorate <i>(Regulated as contaminant)</i>	Food supplement, moringa	Germany	1.8
	Moringa powder	Germany	1.6
	Dill, dried	Unknown	0.68
	Oregano, dried	Unknown	0.49
	Cumin seeds	Egypt	0.44
	Moringa powder	Kenia	0.41
	Food contact material, straw	China	0.32
	Thyme	Unknown	0.30
	Beetroot powder	Unknown	0.30
	Brazil nut	Unknown	0.26
	Cumin seeds	Unknown	0.23
	Brazil nut	Unknown	0.23
	Lambs lettuce	Germany	0.21
	Laurel, dried	Unknown	0.19
	Brazil nut	Unknown	0.19
	Chlorate <i>(herbicide, but chlorinated water used in irrigation or sanitation mostly responsible for levels found in food)</i>	Sesame	Unknown
Chili powder		Unknown	1.9
Chili powder		Unknown	1.6
Paprika powder		Unknown	1.0
Paprika powder		Unknown	0.97
Broccoli powder		Unknown	0.95
Tomato		Belgium	0.45
Romaine lettuce		Spain	0.39
Leafy vegetables		Niederlande	0.39
Aubergine		Spain	0.34
Chia seeds		Unknown	0.26
Food contact material, straw		Unknown	0.24
Green beans		Morocco	0.22
Beetroot powder		Unknown	0.16
Avocado	Chile	0.12	
Melamine <i>(Metabolite of cyromazine, but also contaminant originating from multiple sources; regulated as contaminant)</i>	Celeriac	Germany	1.2
	Potato	Germany	1.1
	Potato	Germany	0.98
	Potato	Germany	0.84
	Potato	Germany	0.79
	Potato	Germany	0.74
	Rucola	Germany	0.72
	Celeriac	Germany	0.71
	Lambs lettuce	Belgium	0.67
	Celeriac	Germany	0.55
	Beer ingredients. hops	Unknown	0.52
	Cumin seeds	Unknown	0.52
	Beer ingredients. hops	Unknown	0.51
	Parsley	Germany	0.49
	Fennel	Germany	0.37
Thiocyanate <i>(mostly of natural origin)</i>	Mustard seeds	Unknown	964
	Mustard seeds	Unknown	734
	Mustard seeds	Unknown	652
	Mustard seeds	Unknown	418
	Broccoli powder	Germany	95.2
	Savoy cabbage	Germany	43.1
	Brussels sprout	The Netherlands	31.9
	Cauliflower	Germany	27.8
	Brussels sprout	The Netherlands	25.8
	Brussels sprout	The Netherlands	23.7
	White cabbage	Germany	21.4
	Brussels sprout	The Netherlands	20.8
	Brussels sprout	The Netherlands	20.7
	Brussels sprout	Germany	20.6
Brussels sprout	The Netherlands	19.8	



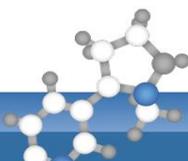
Compound	Commodity	Country of origin	Residue level (mg/kg)
Propamocarb	Oakleaf lettuce	Italy	3.53
	Oakleaf lettuce	France	1.4
	Lollo	Italy	1.2
	Cucumber	Spain	0.57
	Cucumber	Greece	0.54
	Cucumber	Spain	0.54
	Oakleaf lettuce	Germany	0.48
	Tomato	Belgium	0.41
	Cucumber	The Netherlands	0.35
	Broccoli	Spain	0.29
	Leafy vegetables, different salads	The Netherlands	0.28
	Cucumber	Spain	0.27
	Paprika powder	Unknown	0.27
	Cucumber	Spain	0.23
Cucumber	Spain	0.22	
Trimesium <i>(Counter ion of glyphosate but also natural formation during drying process of crops)</i>	Beetroot powder	Unknown	1.46
	Rose hip powder	Unknown	1.11
	Beetroot powder	Germany	0.81
	Beetroot powder	Unknown	0.68
	Broccoli powder	Germany	0.66
	Beetroot powder	European Union	0.59
	Rose hip powder	Unknown	0.38
	Dill, dried	Unknown	0.28
	Parsley, dried	Unknown	0.25
	Broccoli powder	Unknown	0.20
	Black tea	Sri Lanka	0.20
	Herbal tea	Unknown	0.13
	Black tea	Sri Lanka	0.13
	Black tea	India	0.13
Green tee	Japan	0.13	
Propamocarb-N-oxide	Oakleaf lettuce	Italy	0.28
	Cucumber	Greece	0.26
	Lollo	Italy	0.25
	Cucumber	Spain	0.21
	Cucumber	Unknown	0.085
	Oakleaf lettuce	France	0.084
	Cucumber	Spain	0.076
	Cucumber	Spain	0.076
	Oakleaf lettuce	Germany	0.066
	Potato	Germany	0.044
	Melon	Italy	0.042
	Cucumber	Spain	0.042
	Cucumber	Spain	0.037
	Zucchini	Spain	0.034
Cucumber	Spain	0.033	
Bromide	Brazil nut	Unknown	74.2
	Broccoli powder	Germany	54.0
	Barley grass powder	New Zealand	51.7
	Rice	India	47.4
	Brazil nut	Unknown	46.3
	Brazil nut	Unknown	45.0
	Rucola	Italy	44.6
	Brazil nut	Unknown	43.7
	Brazil nut	Unknown	42.4
	Beetroot powder	European Union	40.2
	Molokhia leaves, dried	Germany	39.0
	Rice	India	37.5
	Basil, dried	Unknown	32.6
	Sesame	India	31.8
Figs	Turkey	29.5	


Table 5: Top 10 residue levels of less frequently found QuPPE-compounds (with < 50 findings in total)

Compound	Commodity	Country of origin	Residue level (mg/kg)
Nicotine <i>(acaricide, but tobacco-related contamination mostly responsible for levels found in food)</i>	Raspberry, frozen	Serbia	1.9
	Black tea	India	0.47
	Black tea	India	0.34
	Moringa	Germany	0.24
	Wild mushroom, dried	Germany	0.22
	Molokhia leaves, dried	Germany	0.19
	Food supplement, moringa	Germany	0.17
	Cinnamon	Unknown	0.094
	Black tea	Sri Lanka	0.087
	Food contact material, barbeque	Unknown	0.085
HEPA <i>(Non-regulated metabolite of Ethephon)</i>	Food supplement, spirulina	Unknown	10.4
	Food supplement, spirulina	China	6.8
	Spirulina	Germany	3.7
	Food supplement, spirulina	China	1.8
	Chili powder	Unknown	0.54
	Garlic	Spain	0.39
	White button mushroom	Germany	0.37
	White button mushroom	Germany	0.25
	White button mushroom	Germany	0.23
	White button mushroom	Germany	0.21
Ammelide <i>(Metabolite of some triazine herbicides as well as of melamine, see above)</i>	Food supplement, spirulina	China	0.15
	Food supplement, spirulina	China	0.14
	Food supplement, spirulina	China	0.13
	Potato	Germany	0.084
	King oyster mushroom	Germany	0.077
	Spirulina	Germany	0.074
	Potato	Germany	0.069
	King oyster mushroom	ROK	0.067
	Shiitake mushroom	Germany	0.051
	Bean, without pods	Unknown	0.046
Dimethoate-O-desmethyl	Garlic	Spain	0.33
	Garlic	Germany	0.27
	Chives	Germany	0.21
	Red cabbage	Germany	0.17
	Leek	Germany	0.13
	Black tea	India	0.12
	Onion	Germany	0.095
	Leek	Germany	0.078
	Celeriac	Germany	0.061
	Spring onion	Germany	0.057
Propamocarb-N-desmethyl	Oakleaf lettuce	Italy	0.14
	Oakleaf lettuce	France	0.091
	Cucumber	Greece	0.081
	Cucumber, prepared	Unknown	0.071
	Lollo	Italy	0.055
	Cucumber	Spain	0.051
	Cucumber	Spain	0.028
	Oakleaf lettuce	Germany	0.024
	Cucumber	Spain	0.020
	Cucumber	Unknown	0.016



Compound	Commodity	Country of origin	Residue level (mg/kg)
Glyphosate	Zucchini	Germany	19.2
	Zucchini	Germany	13.1
	Bean, without pods	Unknown	1.7
	Lentil	Unknown	1.4
	Mustard seeds	Unknown	0.65
	Mustard seeds	Unknown	0.58
	Oregano, dried	Unknown	0.50
	Coriander seeds	Unknown	0.44
	Lentil	Turkey	0.41
	Yellow lentil	Turkey	0.41
Chloromequat chloride	Food supplement, curcuma	Germany	1.5
	Paprika powder	Unknown	0.52
	Paprika powder	Unknown	0.45
	Chili powder	Unknown	0.31
	Cereal flakes & porridge	Unknown	0.27
	Rye flour	Unknown	0.19
	Spices	Unknown	0.18
	Rye flour	Germany	0.15
	Rye flour	Germany	0.13
	Cereal flakes & porridge	Unknown	0.075
Ethephon	Pineapple	Costa Rica	0.80
	Raisin and sultana	Unknown	0.79
	Grapes	South Africa	0.45
	Pineapple	Costa Rica	0.28
	Grapes	Chile	0.28
	Sour cherry, frozen	Unknown	0.21
	Grapes	South Africa	0.17
	Grapes	Chile	0.17
	Pineapple	Costa Rica	0.14
	Apple	France	0.10
Mepiquat	Paprika powder	Unknown	0.071
	Paprika powder	Unknown	0.060
	White button mushroom	UK	0.052
	Chili powder	Unknown	0.033
	White button mushroom	Germany	0.015
	White button mushroom	Germany	0.014
	White button mushroom	Germany	0.013
	White button mushroom	Germany	0.011
	White button mushroom	The Netherlands	0.010
	White button mushroom	Germany	0.010
Chloridazon-desphenyl	Rucola	Germany	0.13
	Dill, frozen	Unknown	0.051
	Parsley, frozen	Germany	0.035
	Siberian kale	Germany	0.015
	Spinach, frozen	Unknown	0.012
	Spinach	Germany	0.011
	Parsley	Germany	0.009
	Oakleaf lettuce	Germany	0.009
	Green beans, frozen	Unknown	0.008
	Green beans, frozen	Unknown	0.008



Compound	Commodity	Country of origin	Residue level (mg/kg)
Maleic hydrazide	Potato	Germany	11.5
	Potato	Germany	9.3
	Onion	Germany	5.8
	Onion	Germany	3.9
	Potato	Germany	3.2
	Onion	The Netherlands	3.1
	Potato	Germany	2.1
	Potato	Germany	1.4
	Onion	Germany	0.82
	Potato	France	0.031
Cyromazine	White button mushroom	Poland	1.1
	White button mushroom	Germany	0.88
	Chili peppers	Turkey	0.18
	Cucumber	Greece	0.16
	Spring onion	Egypt	0.052
	Bean	Unknown	0.035
	Green beans	Egypt	0.016
	Green beans	Egypt	0.014
	Melon	Costa Rica	0.009
Glufosinate Met. MPP	Mandarine	South Africa	0.10
	Currant	Germany	0.057
	Grapes	South Africa	0.042
	Nectarine	Chile	0.033
	Raspberry, frozen	Unknown	0.024
	Potato	Israel	0.018
	Lemon	South Africa	0.012