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Fruit

Residue analyses for raspberry, passion fruit, lemon and lime

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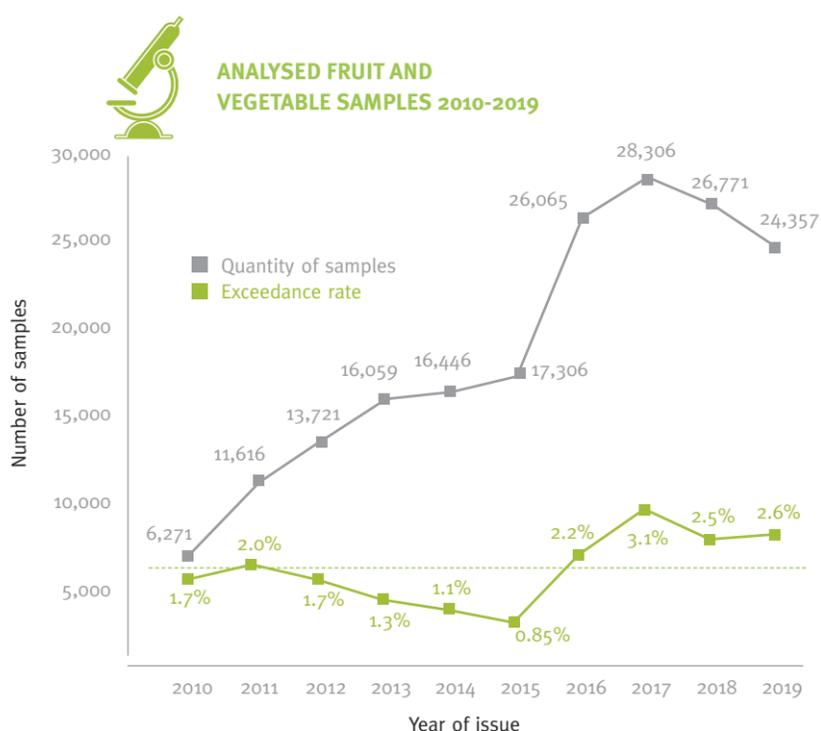
Vegetables

Residue analyses for cauliflower, lamb's lettuce and tomato

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Under the microscope

Multiple, heavy metal and fosetyl-Al residues



QS and DFHV –

Focusing on the residue situation of fruit and vegetables during the last 10 years

Detailed evaluations, interesting facts and background information for practitioners – the annual publication of the Monitoring-Report Fruit, Vegetables, Potatoes ensures transparency in the fresh fruit and vegetables' residue situation since 2010. For the tenth time QS and the DFHV have jointly evaluated analysis data: from the first issue of the Monitoring-Report until today, 186,918 samples of fruit and vegetables have been analysed and detailed evaluations of 48 products have been published – from apples to zucchini.

The exceedance rate* of the past ten years is **1.9% on average** (s. diagram). A clear evidence of the high sense of responsibility of the companies within the QS scheme and of the DFHV's members.

*The exceedance rate refers to the legally defined maximum residue levels (MRLs).

Number of analysed samples per continent (top-10)



AFRICA
 NUMBER OF SAMPLES (TOTAL): 2,179
 NO MRL EXCEEDANCE: 1,961
 EXCEEDANCE RATE: 10.0%

Country	Samples per country	Samples with complaints
Morocco	608	38
South Africa	564	13
Madagascar	457	141
Egypt	225	14
Kenya	101	10
Senegal	46	0
Zimbabwe	41	0
Ivory Coast	35	1
Ghana	16	0
Zambia	15	0



EUROPE
 NUMBER OF SAMPLES (TOTAL): 18,432
 NO MRL EXCEEDANCE: 18,215
 EXCEEDANCE RATE: 1.2%

Country	Samples per country	Samples with complaints
Germany	10,770	76
Spain	2,783	35
Netherlands	1,527	14
Italy	1,282	40
Belgium	1,215	29
Austria	288	0
France	231	4
Greece	104	4
Portugal	70	5
Poland	50	4



NORTH/SOUTH AMERICA
 NUMBER OF SAMPLES (TOTAL): 2,575
 NO MRL EXCEEDANCE: 2,455
 EXCEEDANCE RATE: 4.7%

Country	Samples per country	Samples with complaints
Brazil	746	44
Chile	493	11
Peru	490	22
Colombia	165	9
Costa Rica	154	2
Ecuador	108	2
Mexico	105	8
Argentina	73	6
Uruguay	65	2
Dominican Republic	61	3



ASIA/PACIFIC
 NUMBER OF SAMPLES (TOTAL): 1,171
 NO MRL EXCEEDANCE: 1,082
 EXCEEDANCE RATE: 7.6%

Country	Samples per country	Samples with complaints
Turkey	299	47
Israel	284	15
India	214	4
China	202	12
New Zealand	75	0
Thailand	28	5
Australia	22	4
Vietnam	20	2
Malaysia	19	0
Indonesia	4	0

More than 24,000 fruit and vegetable analyses

CURRENT FIGURES AT A GLANCE

Evaluation period:
 1 October 2017 to 30 September 2018
Total number of samples analysed: 24,357
Number of sample countries: 78
Samples with no active substances detected: 10,158 (41.7%)
Samples with active substances: 14,199 (58.3%)
Rejected samples due to maximum residue level (MRL) exceedance*: 644
Exceedance rate (total): 2.6%
 – Exceedance rate Germany: 0.7%
 – Exceedance rate EU (not including Germany): 1.8%
 – Exceedance rate non-EU countries: 7.2%

* Based on the actual value (measured without taking into account an analytical measurement uncertainty of ±50 percent)



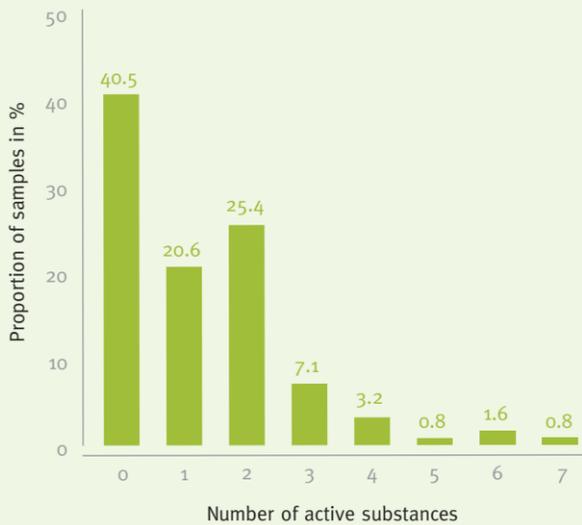
Passion fruit

In the course of the analysis, QS and the DFHV evaluated 126 passion fruit samples from 12 countries of origin. The tropical fruit scores particularly well in terms of the MRL residue concentration: in 84% of the active substances it reached a maximum of 30%.

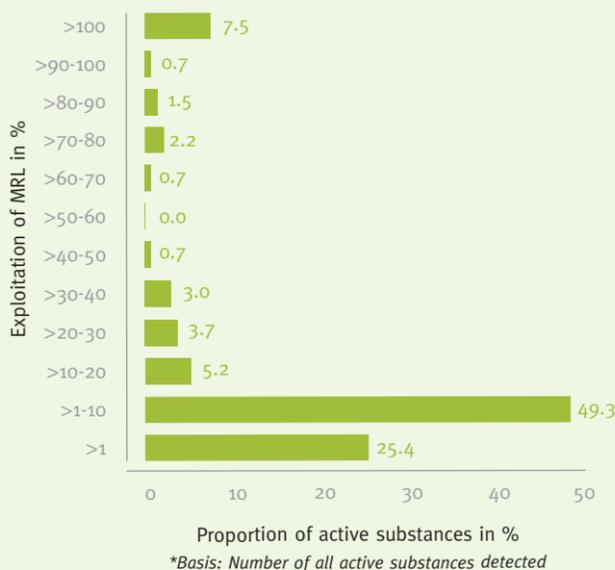
All the samples came from non-EU countries, the majority were from Colombia (64 samples), followed by South Africa (22 samples) and Zambia (11 samples). Almost 41% of all samples were free of residues, including one third of all Colombian samples. A further 46% contained only one or two active substances. All samples with three or more active substances were from Colombia. Among the most frequently detected active substances were the fungicides *tebuconazole*, *fosetyl-Al*, *azoxystrobin* and *trifloxystrobin*.

MRL exceedances were detected in six samples of passion fruit, including the only sample from Ecuador with an MRL exceedance of *acetamiprid*, as well as five samples from Colombia. The exceedances here were recorded for the four fungicides *difenoconazole*, *pyrimethanil*, *pyraclostrobin* and *flutriafol*, as well as for the insecticide *monocrothophos*, which is not approved in the EU.

NUMBER OF ACTIVE SUBSTANCES DETECTED PER SAMPLE

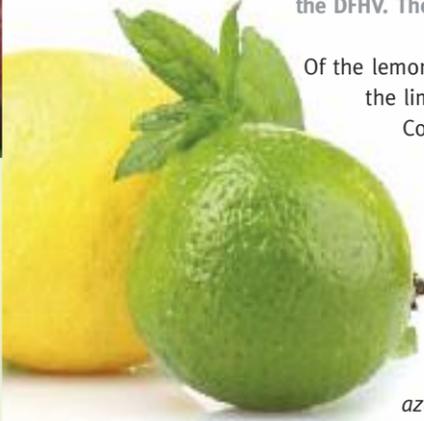


PERCENTAGE OF MRL EXPLOITATION OF ACTIVE SUBSTANCES*



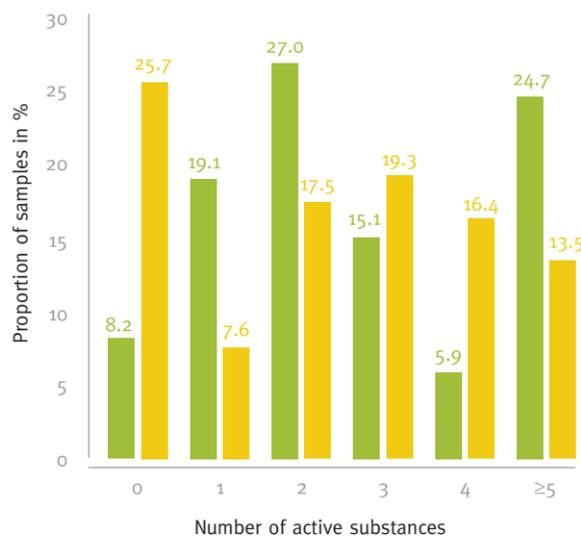
Lemon and lime

392 samples of limes and 171 samples of lemons were part of the analysis carried out by QS and the DFHV. The analysis results were similarly different as the color of both citrus fruits.

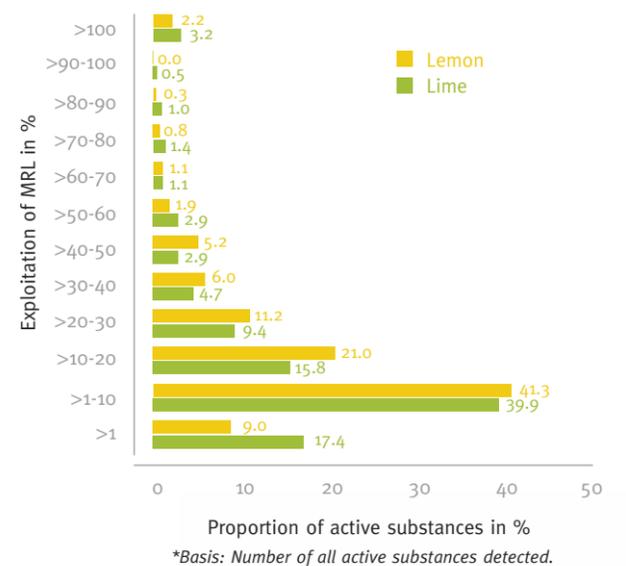


Of the lemon samples, 56% were originally from the EU and most of them from Spain. 99% of the lime samples were from non-EU countries, particularly from Brazil (82%), Mexico and Colombia. For both fruits, more than half of the samples were free or contained up to a maximum of two active substances. The proportion of lemon samples decreases from 26% without any residues, to 18% with two active substances, whereas the curve for limes increases from 8% without residues to 27% with two active substances. Overall, it was possible to detect up to ten different active substances in both products. Nevertheless, in 83% of the analysis results for lemons and limes, the residue concentrations of the active substance reached only a maximum of 30% of the MRL. Three fungicides were among the most frequently detected active substances: *Imazalil* (60% of lemon samples / 80% of lime samples), *azoxystrobin* (9.4% of lemon samples / 26.3% of lime samples) and *thiabendazole* (10.5% of lemon samples / 15.6% of lime samples).

NUMBER OF ACTIVE SUBSTANCES DETECTED PER SAMPLE



PERCENTAGE OF MRL EXPLOITATION OF ACTIVE SUBSTANCES*

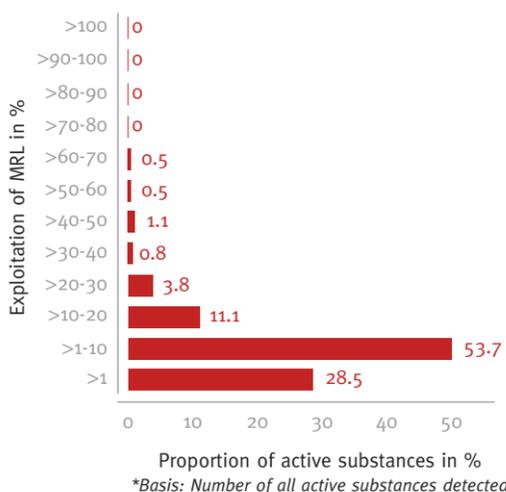


Raspberry

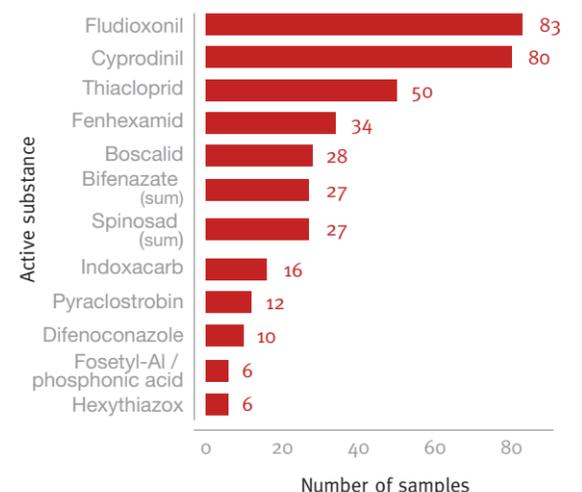
There were 219 raspberry samples on the test bench. The good news for the friends of the summer season fruit: none of the samples exceeded the maximum residue levels.

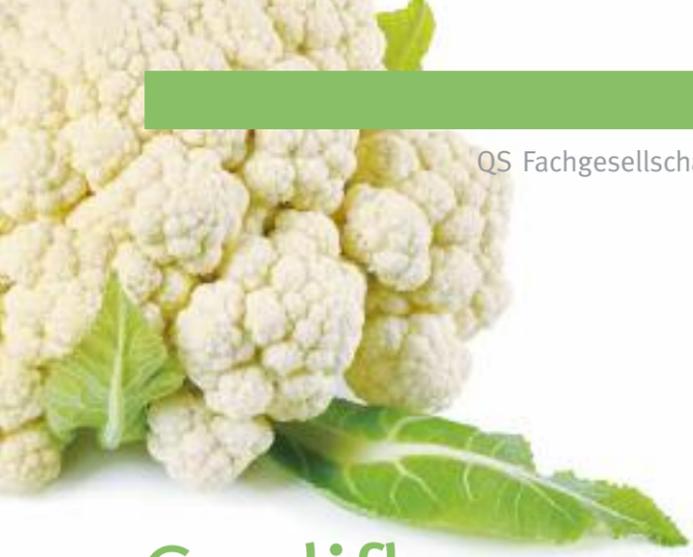
Of 134 samples, more than 61% were from Germany, another 29% from the EU, mainly Spain (45 samples) and Portugal (13 samples). 21 samples were from non-European countries, of which the largest proportion were Moroccan products (19 samples). More than half of all raspberry samples contained none (30%) or only one active substance (21%). Of the 108 samples (49%) containing two or more active substances, 63% were from Germany. A positive picture can be seen in the MRL exploitation: 97% of the detected active substances exploited the legal maximum levels only up to a maximum of 30%. In addition, no MRL exceedance was identified in any of the raspberry samples. A total of 26 different active substances were detected, mainly fungicides, most frequently *fludioxonil* (in more than every 2nd sample) and *cyprodinil* (almost every 3rd sample). Almost every 4th sample contained *thiacloprid* (insecticide), followed by the fungicides *fenhexamid* and *boscalid*.

PERCENTAGE OF MRL EXPLOITATION OF ACTIVE SUBSTANCES*



MOST FREQUENTLY DETECTED ACTIVE SUBSTANCES





Cauliflower

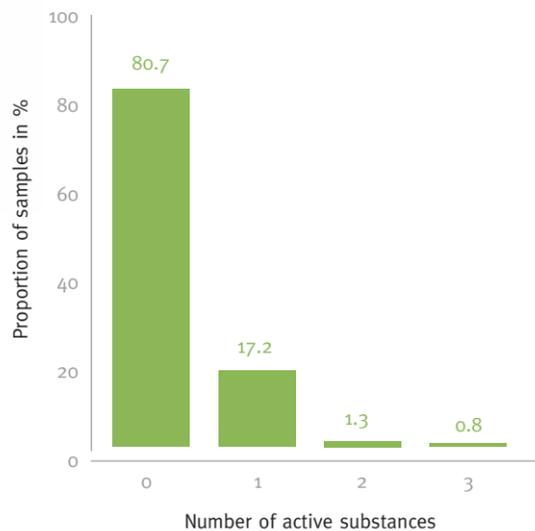
During the evaluation period, 238 cauliflower samples were tested for plant protection product residues. The positive result: no active substances could be detected in more than 80% (192 samples).

Only one active substance was detected in 17.2% of the analysed samples of this cabbage variety, in a further 1.3% two active substances were detected. It was possible to detect a maximum of three active substances of plant protection products in only 0.8% of the cauliflower samples.

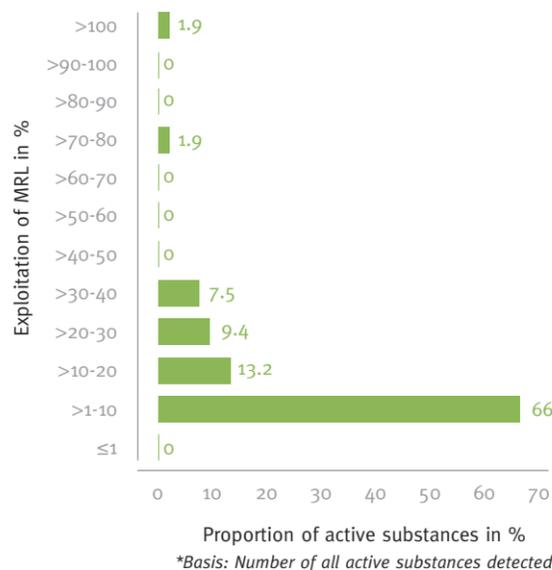
Regarding the detected active substances, in almost 90% of the cases they only reached up to 30% of the maximum residue levels (MRLs). With an exploitation of 165% of the MRL for the active substance *dimethoate* only one of the analysed samples of cauliflower showed an MRL exceedance.

In total, twelve different active substances were detected in the analysis of the samples. The most frequently detected active substance was *spirotetramat* (insecticide). All tested samples were from the EU, of which the largest proportion came from Germany (151 samples). The analysis also included samples of cauliflower from France (25), Italy (24), Spain (21), the Netherlands (8), Belgium (7), as well as one sample from Greece and one from Poland.

NUMBER OF ACTIVE SUBSTANCES DETECTED PER SAMPLE



PERCENTAGE OF MRL EXPLOITATION OF ACTIVE SUBSTANCES*



Tomato

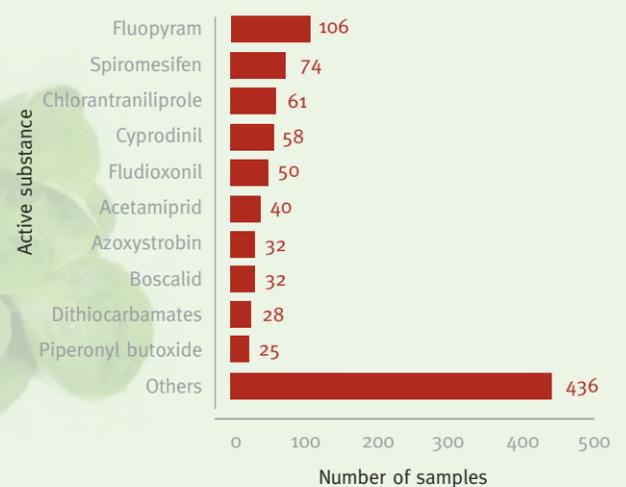
For the Monitoring-Report, QS and the DFHV evaluated 1,119 tomato samples. The red fruiting vegetable performed well: in more than half (55,1%) of all samples tested no plant protection product residues were detected.

Up to ten different active substances per sample were detected in the remaining 44.9% of the samples. Thereof, 97.9% contained a maximum of four active substances. Only 24 samples (2.1%) of this fruiting vegetable exceeded this value, and a single sample (0.1%) contained ten different active substances. Altogether, the evaluation revealed the presence of 74 different pesticide active substances.

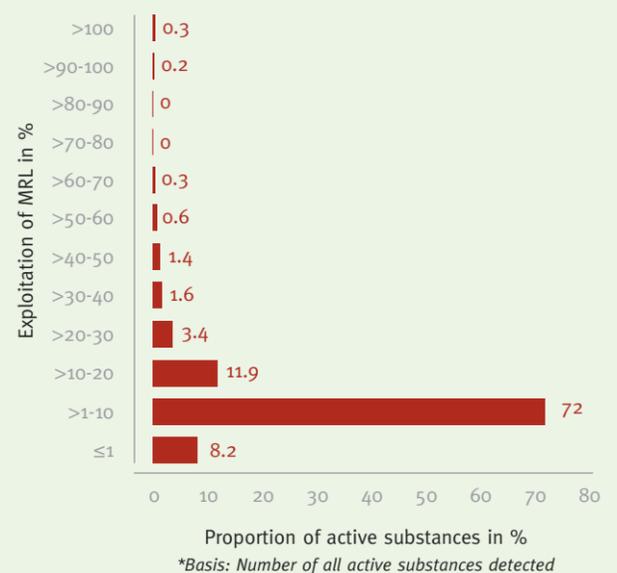
For 80% of the active substances the concentration reached a maximum of 10% of the MRL. Exceedances were only detected in three samples. This concerns the following active substances: *fosetyl-Al* (sum, exploitation 120%), *chlorfenapyr* (exploitation 210%) and *pymetrozine* (exploitation 116%). The most detected substance was the fungicide *fluopyram*, followed by the insecticide/acaricide *spiromesifen* and the insecticide *chlorantraniliprol*.

Over 92% of the tomato samples analysed came from the EU, more precisely from Germany (297 samples), Belgium (287 samples), the Netherlands (273 samples) and Spain (190 samples).

MOST FREQUENTLY DETECTED ACTIVE SUBSTANCES



PERCENTAGE OF MRL EXPLOITATION OF ACTIVE SUBSTANCES*



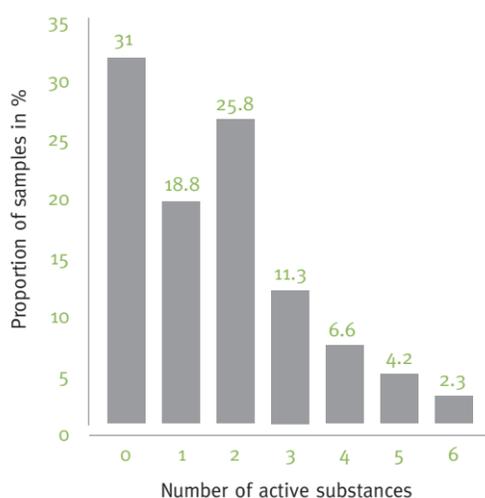
Lamb's lettuce

A total of 213 lamb's lettuce samples from six countries of origin were analysed. The results for the lettuce with the spicy taste were not consistently in the "green range". Only 66 samples (31%) were free of active substances.

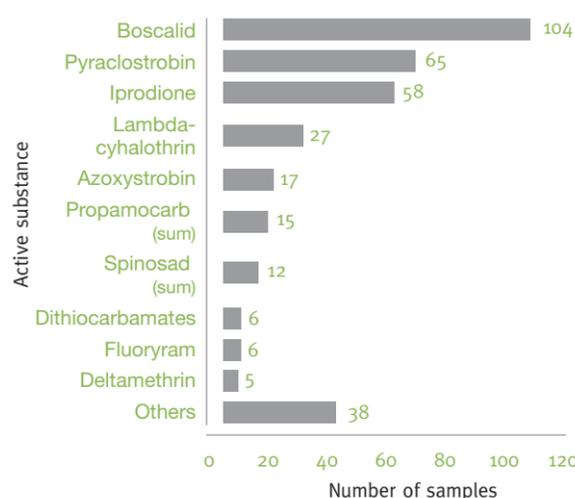
Most of the analysed samples came from Germany (124 samples), followed by Belgium with 39 and France with 31 samples. Of the 69% of lamb's lettuce samples with residues, 18.8% contained one and a further 25.8% a maximum of two active substances. Overall, the analysis revealed the detection of 32 different active substances, the most common being the fungicides *boscalid* (104 samples), *pyraclostrobin* (65 samples) and *iprodione* (58 samples). It should be positively emphasized that in 88.4% of the detected active substances, the exploitation of the MRL was only at a maximum value of 10%. MRL exceedances were identified for the active substances *dieldrin*, *quintozene*, *clothianidin* and *fluazifop*. In the case of the insecticide *dieldrin* it was a legacy. The active substance, which is no longer approved worldwide, is accumulated in the soil as a result of earlier applications and, due to its persistence, only degrades slowly. This can lead to detections or exceedances of the MRLs.



NUMBER OF ACTIVE SUBSTANCES DETECTED PER SAMPLE



MOST FREQUENTLY DETECTED ACTIVE SUBSTANCES



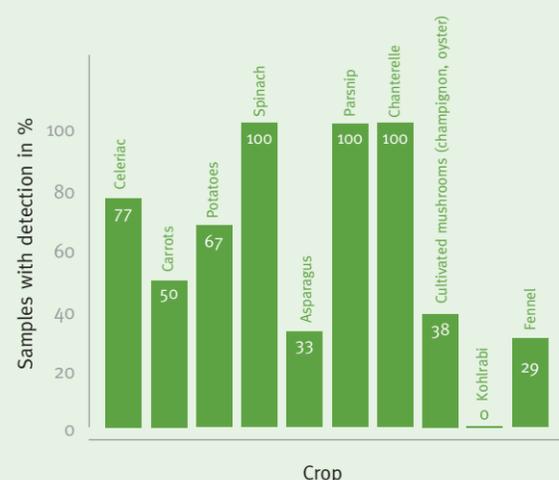
Residues of heavy metals

Focus on celeriac and spinach

In the current issue of the Monitoring-Report, QS and the DFHV consider for the first time the residue situation of heavy metals in fruit and vegetables: 430 samples were tested for cadmium and lead and heavy metals were detected in 260 samples. Among the most frequently tested products for heavy metals were celeriac, followed by carrots, potatoes, spinach and asparagus. The top-10 analysed products, as well as the proportion of samples where cadmium/lead were detected are shown in the following table and figure.

Crop	Number of analyses cadmium/lead
Celeriac	170
Carrots	34
Potatoes	24
Spinach	14
Asparagus	12
Parsnip	12
Chanterelle	8
Cultivated mushrooms (champignon, oyster)	8
Kohlrabi	8
Fennel	7

PROPORTION OF SAMPLES WITH CADMIUM/LEAD DETECTION OF MOST FREQUENTLY ANALYSED PRODUCTS FOR CADMIUM/LEAD



A total of 8 MRL exceedances (1.9%) were reported: four of them were detected for cadmium (2 times spinach, 1 time carrot, 1 time celeriac) and four for lead (3 times celeriac, 1 time white turnip).



Under the microscope

Multiple, heavy metal and fosetyl-Al residues

For the first time, the Monitoring-Report 2019 examined heavy metal and fosetyl-Al residues, as well as the overall situation of multiple residues separately. In which products are cadmium and lead frequently detected? Which crops present most of the exceedances of fosetyl-Al (sum)? How does the residue situation appear in the overall data and in frequently sampled products? Our look through the loupe provides the answers.

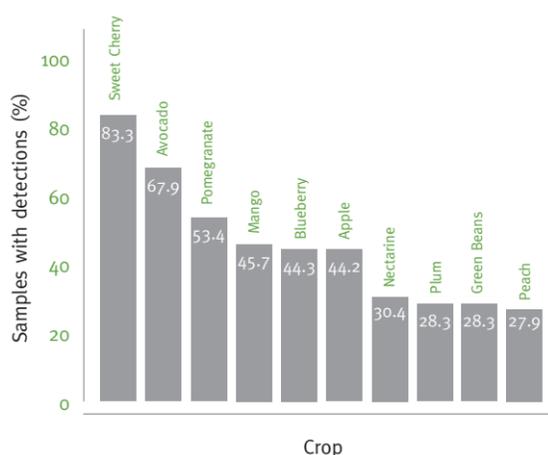
MRL exceedances of fosetyl-Al (sum)

Pomegranate at the front with regards to number of exceedances

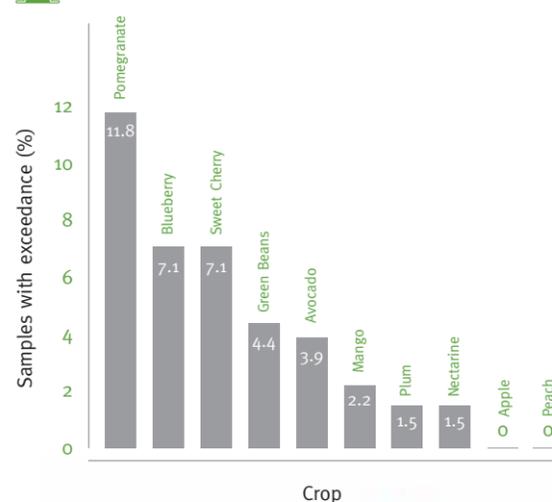
1,814 fruit and vegetable samples were tested for fosetyl-Al /phosphonic acid. The MRL is defined as the sum parameter of fosetyl, phosphonic acid and their salts. Residues of fosetyl or phosphonic acid were detected in 755 samples (41.6%). Sources may be plant protection products, plant strengthening products or fertilisers. An MRL exceedance was found in 65 samples (3.6%). New maximum residue levels are currently in the legislative process and had not

been defined yet at the editorial closing date of this issue. Taking into account the newly proposed MRLs for soft fruits, the values currently found for blueberries, currants and gooseberries would not be exceeded.

DETECTION RATE OF FOSETYL / PHOSPHONIC ACID OF THE MOST FREQUENTLY ANALYSED PRODUCTS



EXCEEDANCE RATE OF THE MOST FREQUENTLY ANALYSED PRODUCTS FOR FOSETYL-AL (SUM)



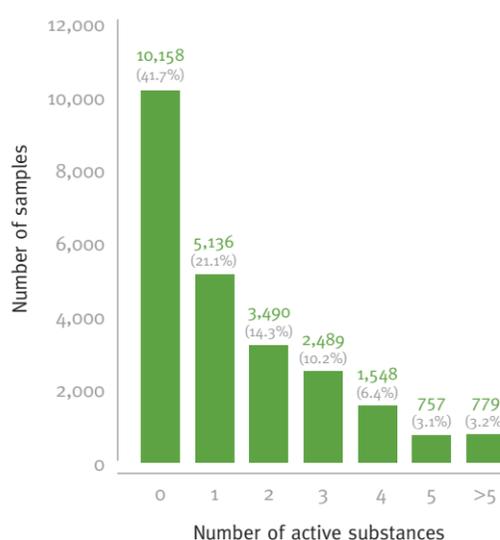
Multiple residues in the spotlight

Slightly more than one third of all samples show multiple residues

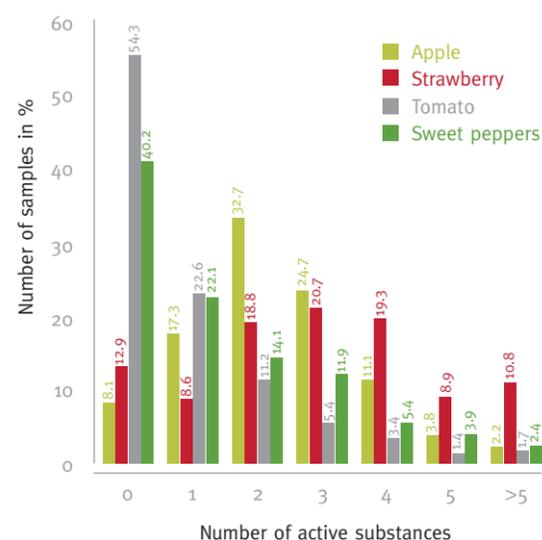
Of a total of 24,357 analysed fruit and vegetable samples, 10,158 samples (42%) were free of active substances. 5,136 samples (21%) presented single and 9,063 samples (37%) multiple residues (>2 active substances/sample) (see Fig.). In the case of frequently sampled crops (apples, strawberries, tomatoes, peppers; see Fig.), despite the detection of multiple resi-

dues, there were no unusual findings regarding the complaint rate: for apples (0.16%), strawberries (0.67%) and tomatoes (0.44%), this was considerably less than one percent. For pepper samples (1.33%) it was slightly higher, but below the overall exceedance rate of 2.6%.

SITUATION MULTIPLE RESIDUES (OVERALL DATA)



SITUATION OF MULTIPLE RESIDUES IN APPLE, STRAWBERRY, TOMATO AND PEPPER



IMPRINT

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