Issue 2016

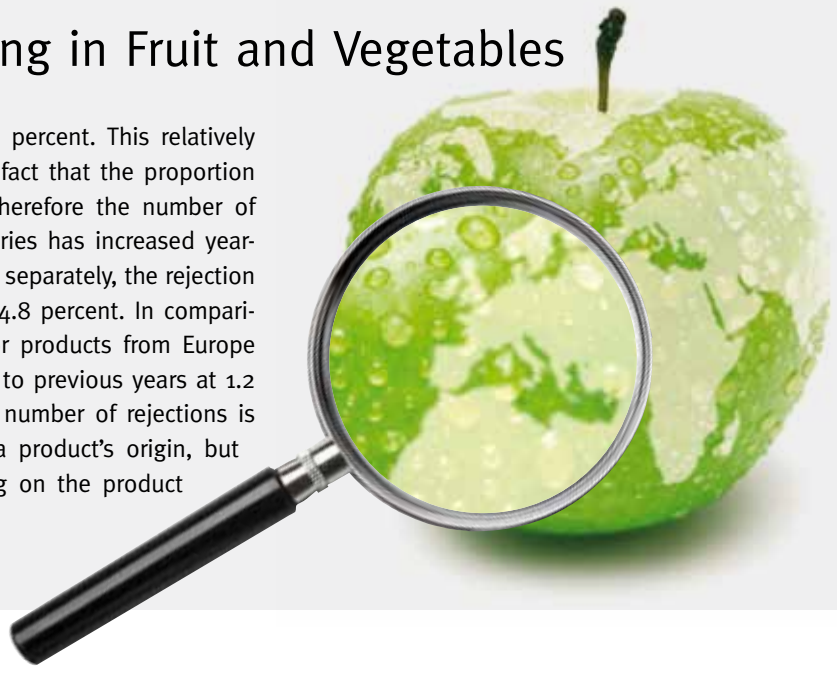
monitoringreport

A PUBLICATION OF QS Fachgesellschaft Obst-Gemüse-Kartoffeln GmbH and DFHV Deutscher Fruchthandelsverband e.V.

Under the Microscope: Residue Monitoring in Fruit and Vegetables

QS and DFHV analyse 26,065 samples from 75 countries

For this monitoring report, the German Fruit Trade Association (Deutscher Fruchthandelsverband e.V., DFHV) and QS Qualität und Sicherheit GmbH analysed a total of 26,065 samples from 75 countries, a 50 percent increase compared with the sample volume from the previous issue. The samples were collected between 1 October 2014 and 30 September 2015. In 43.1 percent of all samples, no residues of plant protection products were detected whatsoever. With regard to the maximum residue levels from this year's total evaluation, the rejection rate amounts to 2.2 percent. This relatively high value is due to the fact that the proportion of exotic products and therefore the number of samples from third countries has increased year-on-year. When considered separately, the rejection rate in third countries is 4.8 percent. In comparison, the rejection rate for products from Europe is of a similarly low level to previous years at 1.2 percent. In principle, the number of rejections is not only dependent on a product's origin, but can also differ depending on the product group.



No Limits to Analytics?

Residue analyses of plant protection products in fresh fruit and vegetables have been carried out since the 1960s. In the past few decades, methods of analysis have consistently improved and become more and more sensitive. This is particularly evident in the progression of detection limits. Around forty years ago, trace analysis was capable of detecting residues of plant protection products of 1 mg/kg (10^{-6}). Twenty years ago, this had already improved to 0.001 mg/kg, which corresponds to 1 µg/kg (10^{-9}). Today, 0.000001 mg/kg, or 1 ng/kg (10^{-12}), can be detected. This means that detection capabilities have improved from 10^{-9} to 10^{-12} in the last twenty years alone – in other words, by a factor of 1,000!

By way of comparison:
1 µg/kg means the identification of a single rye grain in 50 tonnes of wheat, which equates to around 1 freight wagon filled with 50 tonnes of wheat.
1 ng/kg means the identification of a single rye grain in 50,000 tonnes of wheat, which equates to around 1,000 freight wagons, each filled with 50 tonnes of wheat.

Does this mean we have reached the limits of analytics? Have analysis methods, which have been consistently improving over the last 40 years, led to any new findings regarding the assessment of potential risks? And what effect do ever-improving analysis methods have on the perception of food-related risks? We have asked three experts what they think about these questions, which new analytical possibilities they expect in the future and which benefits this could bring to the sector and to consumer protection.

Expert Opinion

Dr. Jürgen Kuballa
President of DeLOG, CEO of GALAB Laboratories GmbH

Analytical technology has been consistently improving in recent years. Particular advances have been made in the detection of polar pesticides such as glyphosate, phosphonic acid and chlorate. However, these new analytical possibilities also raise questions about the legal assessment of results. What use is a reliable measurement result if there is no clear legal assessment, as is the case with chlorate, for example? This situation reveals an obvious weakness in the system, which was also evident in the asymmetric publication of the ARfD value and maximum residue levels for chlorpyrifos. In light of this, it seems to make little sense to encourage more and more innovations in analytical technology when legal certainty is not ensured by the authorities beforehand. This would not only benefit the industry, but also consumer protection. More intensive cooperation between private and state laboratories as well as authorities is therefore absolutely necessary, in my opinion.

Ellen Scherbaum
Chemical and Veterinary Investigation Office Stuttgart

With LC-MS/MS, which is suitable for routine applications, the field of pesticide analysis has undergone a radical change in recent years. As a result of this, it is now possible to analyse a large number of active substances with potent multi-methods. One might ask if it is necessary for measuring devices to become even more sensitive. After all, identifying the insecticide chlorpyrifos in the ppb range is sufficient, for example. Many people would say that going even lower than that is unnecessary. However, for newer substances, for metabolites, which are increasingly being included in residue definitions, even the most sensitive device is often insufficient. Furthermore, more sensitive devices provide the option of packing many analytes into one method, thus saving on staff and measuring time. And sensitive high-resolution mass spectrometry increasingly offers the possibility of screening. In conclusion, we still have not reached the end of the road. As long as more new substances are approved and toxicological evaluations continue to be changed and refined, then analytics will also face many more challenges in ensuring consumer protection.

Dr. Gustav Offenbächer
Expert on residue analytics and quality control

Current residue analytics for plant-based foods is characterised by a high sample throughput, short processing times and efficient mass spectrometry detection methods. As a result, almost all plant protection product residues can now be qualitatively detected and quantified using multi or single methods. The use of liquid chromatography (LC-MS/MS) has expanded the pesticide spectrum to include key active substances including metabolites, and even the detection of highly polar compounds has become routine. Results are evaluated in terms of marketability using the maximum residue level (MRL) and the approval situation, as well as on health grounds using the acute reference dose (ARfD). This has led to a high degree of safety in tested foods. In general, the required lower limits of determination were previously 0.01 mg/kg. Thanks to modern analytical devices, lower levels can now be detected in principle and, with extra effort, even be achieved in routine tests. I do not really see any problems in the analytical sector, but rather in determining the causes of such low residue levels and evaluating them. This requires analysts and the ordering customer to have detailed knowledge of the environment in which the active substances and contaminants have entered the sample.

Number of Samples per Country

EUROPE	**18,626**
Germany	9,826
Spain	3,814
Italy	1,800
Netherlands	1,157
Belgium	1,067
France	355
Greece	267
Austria	96
Portugal	86
Hungary	44
Poland	31
Denmark	29
Romania	15
Cyprus	12
Great Britain	8
Croatia	7
Belarus	5
Serbia	3
Macedonia	2
Bosnia-Herzegovina	1
Switzerland	1
AFRICA	**2,682**
South Africa	921
Madagascar	691
Egypt	313
Morocco	299
Kenya	107
Zimbabwe	93
Ethiopia	86
Senegal	49
Ivory Coast	32
Namibia	24
Ghana	23
Burkina-Faso	16
Tanzania	8
Zambia	6
Mali	4
Guinea	2
Tunesia	2
Uganda	2
Benin	1
Guinea-Bissau	1
Cameroon	1
Somalia	1
ASIA/PACIFIC	**1,470**
Israel	367
India	320
Turkey	320
China	218
New Zealand	149
Malaysia	44
Thailand	32
Vietnam	8
Iran	4
Russia	4
Australia	2
American-Samoa	1
Indonesia	1
NORTH/SOUTH AMERICA	**3,287**
Ecuador	707
Chile	640
Brazil	627
Peru	484
Argentina	182
Costa Rica	181
Colombia	147
Uruguay	103
Mexico	87
Dominican Republic	31
Puerto Rico	29
Guatemala	24
USA	19
Honduras	11
Panama	8
Nicaragua	3
Surinam	2
American Virgin Islands	1
Jamaica	1
Total number of samples	**26,065**

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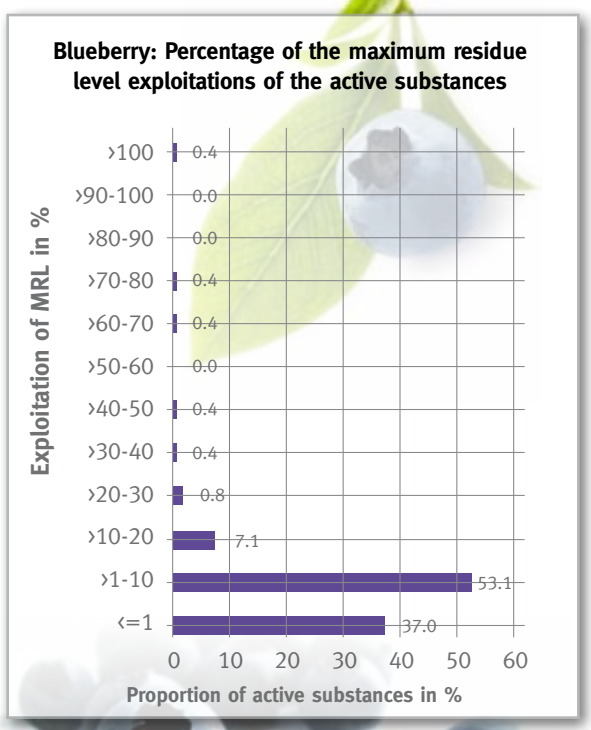
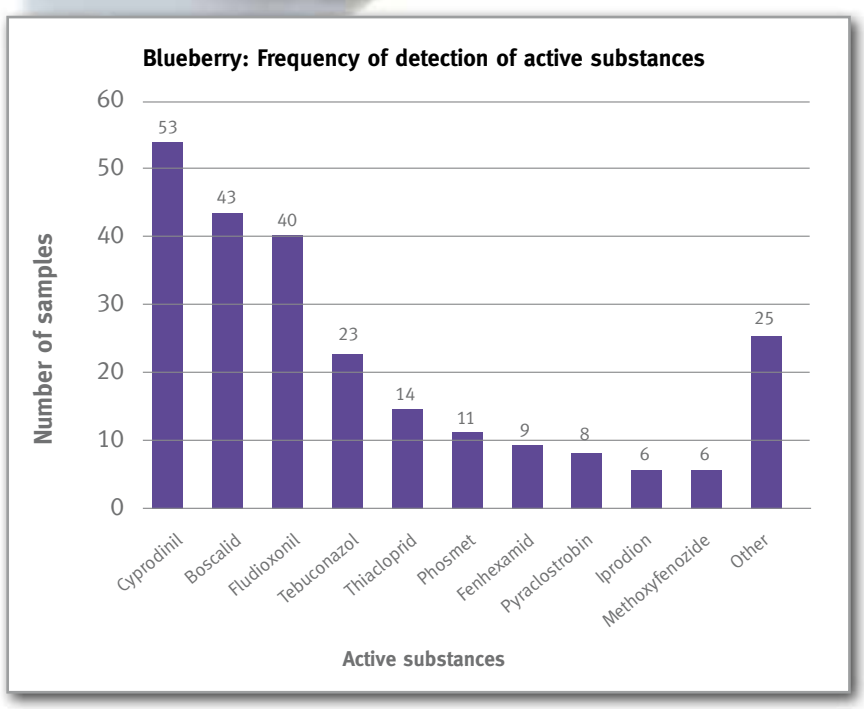
Blueberry

Top marks for the 2015 Fruit of the Year

In the vote for Fruit of the Year in 2015, the blueberry emerged victorious. The crucial factor was without doubt the positive effects of its natural colourant, which lends the fruit its deep blue colour: Myrtillin protects the immune system and has also been shown to protect cells against bacteria and free radicals.

Between 1 October 2014 and 30 September 2015, QS and the DFHV analysed a total of 207 blueberry samples for residues of plant protection products. The majority of the analysed samples originated in Germany with 53 percent, followed by Chile (13 percent) and Spain (12 percent). Almost half of the blueberry samples contained no residues of plant protection products. Only one sample exceeded a maximum residue level. This came in a Romanian sample in which the statutory maximum level of the fungicide chlorothalonil was exceeded to a significant degree. The rejection rate for exceeding the maximum residue levels is therefore just 0.5 percent.



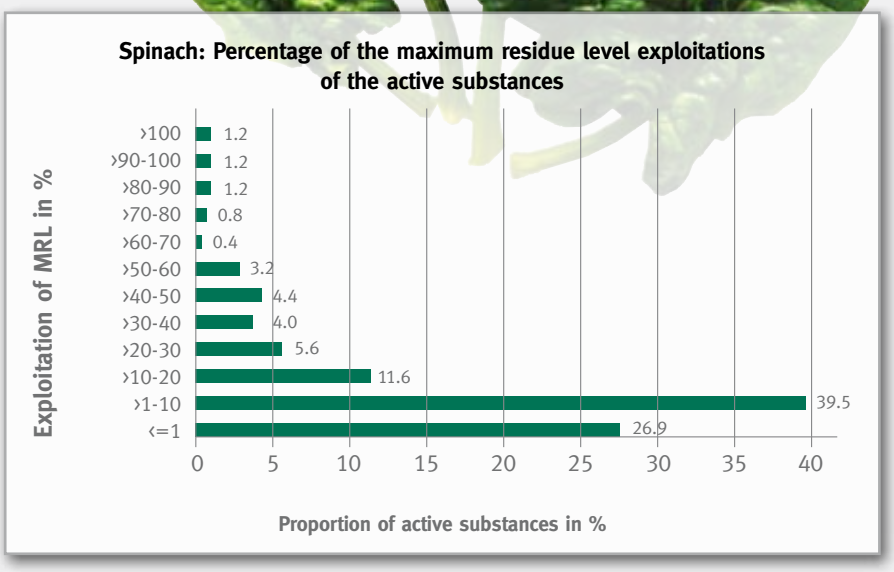


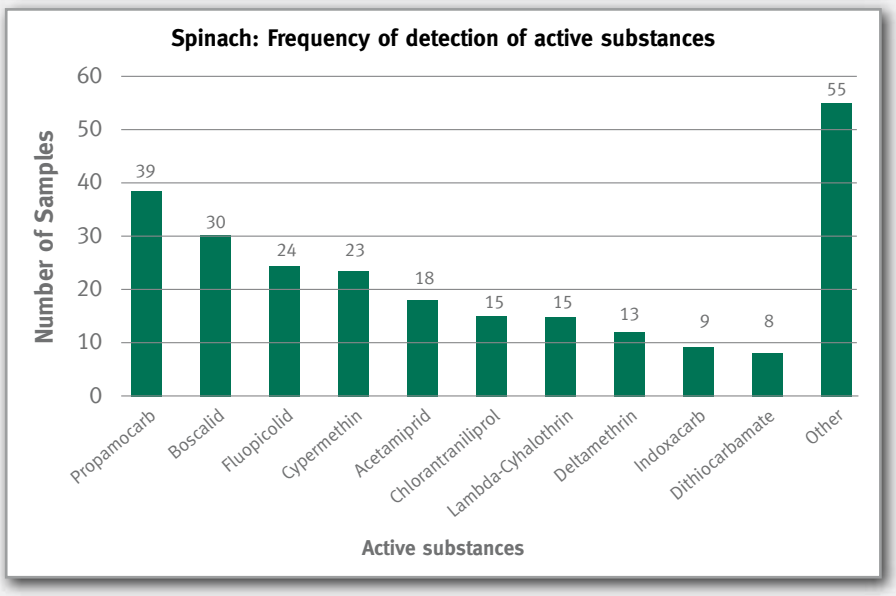
Spinach

Positive results for the leaf vegetable

For decades, spinach was reputed to contain very high levels of iron. In 1890, the Swiss physiologist Gustav von Bunge calculated that 100 g spinach contained 35 mg iron. However, he had the decimal point in the wrong place – it is actually only 3.5 mg. Nonetheless, the leaf vegetable, which originally comes from Persia, is extremely healthy. Spinach is rich in potassium, calcium, magnesium and folic acid.

The majority of the 141 samples collected originated in Germany, Italy and Spain. One third of the analysed samples were free of plant protection product residues, while 20 percent exhibited residues of a maximum of one active substance. Three samples had to be rejected for exceeding the maximum residue levels. In two samples from Spain, the limit value for the insecticide cypermethrin was exceeded, while one sample from Italy was rejected due to significantly elevated dithiocarbamate residues. This means that the maximum levels of plant protection product residues were exceeded in 2.1 percent of all cases. In addition, the valid maximum level for nitrate* was exceeded in 3.5 percent of spinach samples. These rejected samples also originated in Italy and Spain.





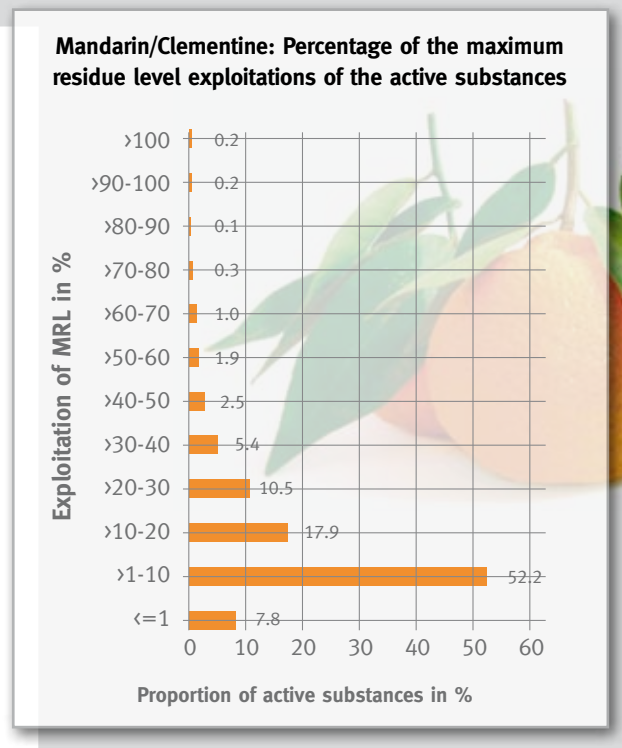
*The determination of maximum levels for the contaminant nitrate is laid out in Regulation (EU) No. 1258/2011 and is not regulated by Regulation (EC) No. 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin.

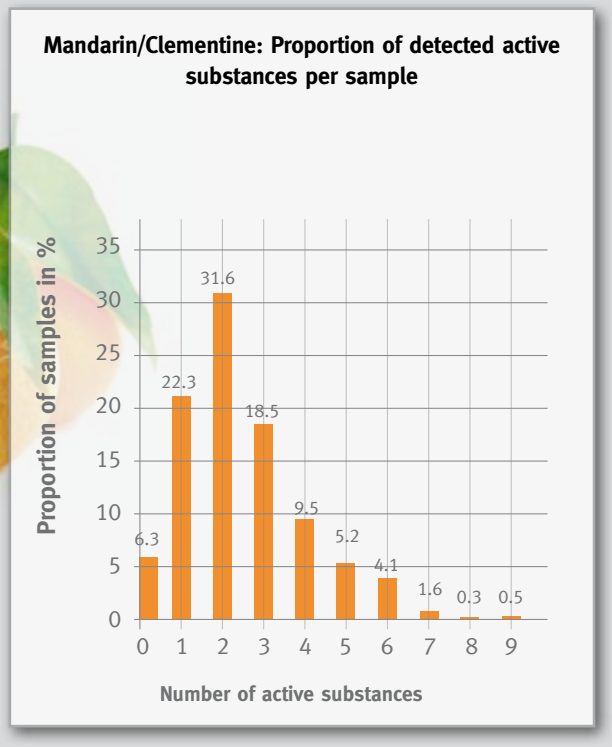
Mandarin/Clementine

Citrus fruits beyond reproach

In addition to their sweet and fruity taste, these "little sisters" of oranges are also full of vitamins that are very useful for the human body, particularly in the colder months. Mandarins and clementines are a good source of vitamin C in particular, with just 100 grams of the citrus fruits providing a third of the daily requirement of vitamin C.

In total, the DFHV and QS analysed 367 samples from ten different countries of origin for residues of plant protection products. 80 percent of the samples came from Spain, with South Africa and Uruguay taking second and third place with around 5 percent of the samples each. Almost all of the analysed samples contained residues of plant protection products. For instance, imazalil, a typical surface-treatment product for citrus fruits, was found in more than 270 of the analysed samples. In addition, the active substance chlorpyrifos (insecticide) and pyrimethanil (fungicide), which are approved in Spain, were frequently detected. In two mandarin samples from Turkey, the maximum residue levels were exceeded for the insecticides malathion and tau-fluvalinate. Based on the total number of samples, this means the maximum residue levels were exceeded in 0.5 percent of all cases.





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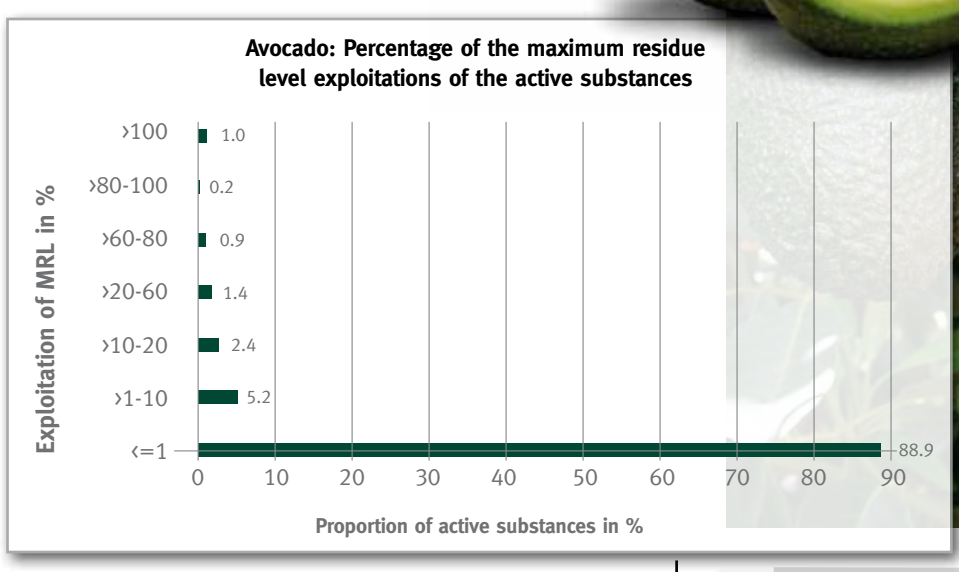
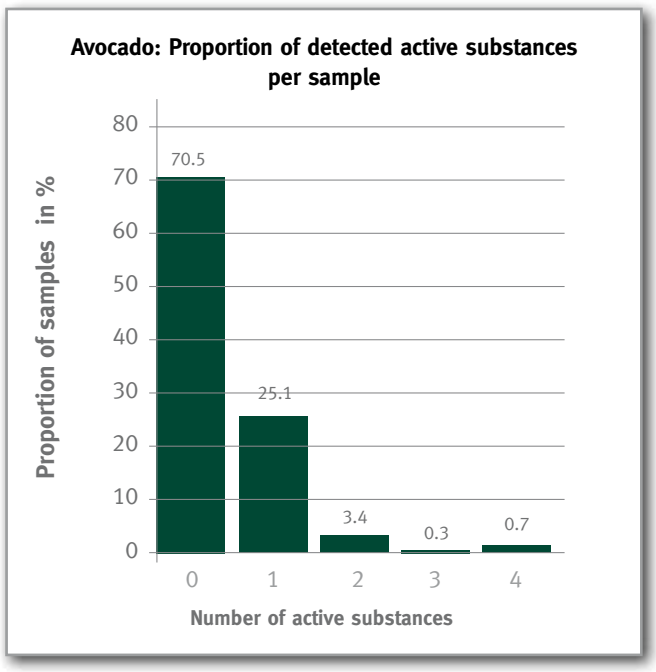
Avocado

The exotic fruit passes with flying colours

40 years ago, almost no one in Europe knew what it was, but today the avocado is one of Germany's most popular exotic fruits. In Central America, where the fruit originally comes from, the avocado has been valued highly for thousands of years and is known as "green gold". As it contains almost all essential nutrients, the avocado can be considered the most nutritious fruit in the world.

Of the 295 avocado samples from twelve different countries that were analysed, 40 percent came from Peru, followed by Chile (17 percent), Spain (10 percent), Mexico (8 percent) and South Africa (7 percent). The result was positive, with 70 percent of samples free of residues and a further 25 percent containing only one active substance. Furthermore, the levels of active substances in around 90 percent of all analysis results were well below the limit values and amounted to a maximum of 1 percent of the established maximum residue levels. However, 5 samples had to be rejected (1.7 percent), including 3 samples from Peru which exceeded the maximum residue levels for thiabendazole, prochloraz and thiamethoxam/clothianidin. A further two samples from Chile contained contamination with substances which did not originate from their application as plant protection products. The disinfectant DDAC and the fertilizer and plant strengthener fosetyl-al were found to be above the maximum values. The fungicides thiabendazole and prochloraz (post-harvest treatment agents to prevent the formation of mould) as well as fosetyl-al and spirotetramat (insecticide) were the main substances detected.



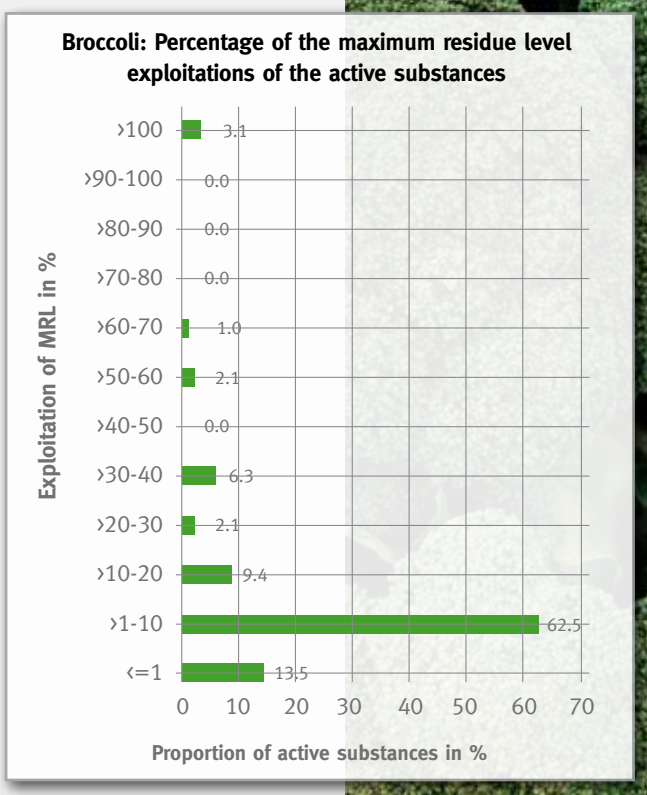


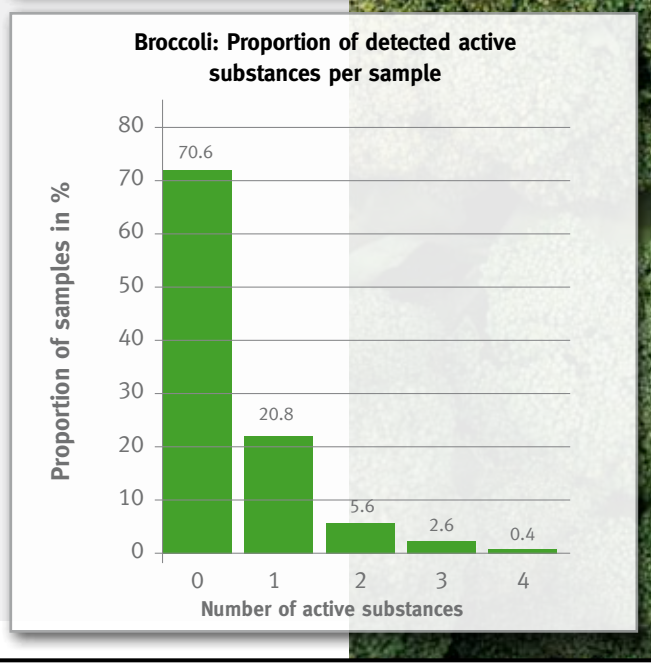
Broccoli

The cabbage that knows how to impress

Broccoli is the closest relative of the cauliflower. A type of cabbage with a delicate spicy flavour, it generally arrives on German plates in its green form. However, there are also yellow and purple variants, the latter of which is extremely popular in Italy in particular.

In total, analysis results from 231 broccoli samples from six different countries were evaluated. 48 percent of the analysed samples originated in Spain, with a further 40 percent coming from producers in Germany. 71 percent of all tested samples were free of active substances. Of the remaining samples, 70 percent contained just one single active substance. Frequently detected substances included the insecticides spirotetramat, imidacloprid and the fungicide boscalid. Active substances above the prescribed maximum residue levels were detected in around 1.3 percent of broccoli samples. In these cases, the maximum residue levels were exceeded even when considering a measuring uncertainty of 50 percent. These came from Spanish samples with the active substances etofenprox, fluazifop-p-butyl and iprodione which are approved there.





Radish

The small tubers make a big impression

Their name is derived from the Latin word radix (English: root). Botanically speaking, radishes belong to the cabbage (brassicaceae) family and are extremely healthy. These small red tubers are rich in vitamins and minerals such as potassium, calcium, iron, vitamin A, B1, B2 and C.

In more than two thirds of the 153 radish samples taken by QS scheme participants and DFHV member companies, no residues of plant protection products were detected. In the remaining radish samples, only one active substance was found in most cases. These were primarily fungicides such as dimethomorph, propamocarb or azoxystrobin. This good impression is confirmed by the exploitation of the maximum values. Frequently, the levels detected amounted to less than 10 percent of the limit values and the maximum residue level was not exceeded in any of the samples.

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Know-how: Correct sampling

Great interest, great practical benefits

Valid analysis results are the most important requirement for the stable residue monitoring of fruit, vegetables and potatoes. Should the sampling process not be carried out in a competent and representative way, then the results will ultimately vary even if the laboratory analysis is of a high standard.

In the autumn of 2015, QS, DFHV and BVEO offered a series of events on the subject of correct sampling for wholesalers and coordinators. As part of these events, a theory section provided the participants with specific instructions for the technical implementation of representative sampling and highlighted typical sources of errors or contamination. In the practical part, they received tips for sampling in the field, in the greenhouse and in the warehouse. Dr. Felix Lippert, owner of Hortkinetix and managing director of the Dr. Lippert GmbH laboratory, led the events. At the beginning of each event, Carina Gotto of QS informed the participants of the latest developments in QS residue monitoring and how QS scheme participants can easily evaluate the results of their own analyses according to various specifications using the QS database.
The five events on correct sampling, which took place between October and November 2015 in Jork, Mutterstadt, Roisdorf, Leipzig and Reichenau, were received with great interest. The events were fully booked shortly after the dates were announced.

Dr. Lippert gives practical tips on sampling

In the theoretical part of the event, valuable tips were given regarding the implementation of representative sampling

Wolfgang Wenzel,
Central Quality Management at EDEKA Handelsgesellschaft Südwest mbH

"In my opinion, the event dealt with the issue of sampling from all angles in a comprehensive manner. It was illustrated to the participants that, even though competent sampling is expensive and time consuming, it is a basic requirement for arriving at valid results. The presentations were very practical in nature and clearly demonstrated the responsibilities of the samplers for the subsequent lab result."

Oliver Dobusch
Head of Quality Control at REWE Group Fruchtlogistik

"My colleagues and I found it particularly helpful to be reminded of where errors in sampling can typically occur and how this can affect the analysis results. Overall, we liked the large number of practical benefits offered by the event. The most important aspects of fruit and vegetable sampling were clearly explained in a practically relevant way."

DFHV

FrischeSeminar Expands Further Training Programme for Quality

The DFHV training platform FrischeSeminar reacted to the increasing requirements of quality management and quality assurance in 2015 by offering further training for employees in this area of responsibility

One new aspect of the training programme was the well-attended one-day seminar "HACCP in Practice – Leadership and Management Tool". Workers at the beginning of their careers together with "old hands" of quality management made use of the in-service qualification to expand and refresh their knowledge of HACCP. Due to high demand, FrischeSeminar 2016 will offer both a basic and advanced seminar with a focus on HACCP.
In the further training seminar "Importing Fruit from A to Z", the DFHV training platform informed participants about the complex interrelationships involved in customs. Speakers included proven experts and practitioners from the international fruit trade business.

In 2015, the seminar "Banana Ripening: Basic Procedure in the Ripening Process – Physiology of the Ripe Banana – Ripening Technology and Ripening Management" was also premiered in cooperation with DFHV member Interweichert in Hamburg. Due to considerable interest, two seminars were held in 2015. For 2016, the DFHV is planning to increase its focus on ripening in the training programme and will offer a three-day seminar series at various locations in Germany.

Keeping a firm eye on the quality of fruit and vegetables

Frische Seminar
Die Bildungsplattform des Deutschen Fruchthandelsverbandes e.V.

unterstützt von FRUIT LOGISTICA

DFHV Seminar Dates 2016

16 February	Quality and Incoming Goods Inspections, Specialist seminar (basic), Bonn
24 February	The Fruit and Vegetable Market: An Overview – Structures and trends (basic) in cooperation with Agrarmarkt Informationsgesellschaft mbH, Bonn
3/4 March	Merchandise Knowledge in the Fruit and Vegetable Sector, trainee seminar, Bonn
15 March	Holding Successful Discussions with Customers, specialist seminar (basic) in cooperation with Andreas Hermes Akademie, Bonn
13 April	The Fresh Fruit Market Under the Microscope – pipfruit, grapes, soft fruit and kiwis (basic) in cooperation with Agrarmarkt Informationsgesellschaft mbH, Bonn
14 April	HAACP Basics for the Fruit and Vegetable Sector, specialist seminar (basic), Bonn
19 April	Importing Fruit from A to Z, specialist seminar (basic) in cooperation with IPD (Import Promotion Desk), Bonn
26 April	Truly Organic! Effectively Protecting the Integrity of Organic Produce when Importing from Third Countries, specialist seminar (advanced), Bonn
31 May	Quality and Incoming Goods Inspections – Focus on Vegetables, specialist seminar (basic), Bonn
8 June	HACCP Advanced for the Food and Vegetable Sector, specialist seminar (advanced), Bonn
1/2 Sept.	Merchandise Knowledge in the Fruit and Vegetable Sector, trainee seminar, Bonn
12-16 Sept. + 26-30 Sept.	Fruit Trader Seminar, IHK (Chamber of Industry and Commerce) Certificate Course, Bad Honnef
22 September	Fresh Fruit Market Under the Microscope – Citrus Fruits, Stone Fruit, Melons and Exotic Fruits, specialist seminar (basic) in cooperation with Agrarmarkt Informationsgesellschaft mbH, Bonn
6 October	Communication and Interaction with Auditors, specialist seminar (basic), Bonn
18 October	Quality and Incoming Goods Inspections – Focus on Fruit, specialist seminar (basic), Bonn
8 November	Packaging: Labelling/Declaration of Conformity/Migration, specialist seminar (advanced), Bonn
16 November	Quality and Incoming Goods Inspections, specialist seminar (basic) in cooperation with the GHVG (Großmarkt Hamburg Verwaltungsgenossenschaft e.G.)
29 November	Intercultural Conflict Management, specialist seminar (basic) in cooperation with IPD (Import Promotion Desk), Bonn

DFHV
QS. Ihr Prüfsystem für Lebensmittel.

Imprint

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