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Monitoring of Pesticide Residues in Products of Plant Origin in the European Union, Norway, Iceland and Liechtenstein

2002 Report

This report "Monitoring of Pesticide Residues in Products of Plant Origin in the European Union, Norway, Iceland and Liechtenstein" – Report 2002 - was forwarded to the "Standing Committee on the Food Chain and Animal Health – section plant protection products – pesticide residues working group" for agreement on publication on 17 June 2004. The Standing Committee agreed that publication was desirable and noted that this was also the view of Norway, Iceland and Liechtenstein.

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1. INTRODUCTION

This report covers the national situations with regard to pesticide residues monitoring for the calendar year 2002 in the 15 EU Member States and the three EFTA States who have signed the EEA agreement[1] (Norway, Iceland and Liechtenstein). By its nature as a summary, this document gives an overall view of the monitoring of pesticide residues. More detailed information about the situation in individual countries is available from the respective national monitoring authorities and can be requested from them. To complement the data, Member States and the EEA States contribute a short national statement (in English) for inclusion in this document (see Annex I). The issue of pesticide residues in foodstuffs of animal origin, as regulated in Council Directive 86/363/EEC[2], is not covered by this report.

2. LEGAL BASE

In Council Directives 86/362/EEC[3] and 90/642/EEC[4], as amended, maximum levels are fixed for pesticide residues in and on products of plant origin. Member States are asked to check regularly the compliance of foodstuffs with these levels. Inspections and monitoring should be carried out in accordance with the provisions of Council Directive 89/397/EEC[5] on the official control of foodstuffs, and Council Directive 93/99/EC[6] on additional measures concerning the official control of foodstuffs. For the year 2002 Commission Directive 79/700/EEC[7] on sampling was still applicable[8].

Besides national monitoring programmes, the Commission services recommended, via Commission Recommendation 2002/1/EC[9], the participation of each Member State in a specific EU co-ordinated monitoring programme. These programmes began in 1996. Their aim is to work towards a system which makes it possible to estimate actual dietary pesticide exposure throughout Europe. The monitoring programme was designed as a rolling programme covering major pesticide-commodity combinations in a series of 5-year cycles and the first cycle was completed in 2000. This 2002 report is the second report of the second cycle, which is designed as a 3-year cycle. The time span was reduced to 3 years in order to have a picture of the dietary intake situation after a shorter period of time. The choice of commodities includes the major components of the Standard European Diet of the World Health Organisation.

Article 7 of Council Directive 86/362/EEC and Article 4 of Council Directive 90/642/EEC, as amended by Council Directive 97/41/EC[10], require Member States to report to the Commission the results of the monitoring programme for pesticide residues carried out both under their national programme and under the EU co-ordinated programme. A common

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[1] Agreement on the European Economic Area
[2] Official Journal No L 221, 07/08/1986 p. 0043 - 0047
[3] Official Journal No L 221, 07/08/1986 p. 0037 - 0042
[4] Official Journal No L 350, 14/12/1990 p. 0071 - 0079
[5] Official Journal No L 186, 30/06/1989 p. 0023 - 0026
[6] Official Journal No L 290, 24/11/1993 p. 0014 - 0017
[7] Official Journal No L 207, 15/08/1979 p. 0026 - 0028
[8] From 1.1.2003 Commission Directive 79/700/EEC has been repealed by Commission Directive 2002/63/EC
[9] Official Journal No L 2, 04/01/2002 p. 0008 - 0012
[10] Official Journal No L 184, 12/07/1997 p. 0033 - 0049

format for the reports on the Community programme was agreed in document SANCO/11/2003. The Commission is required to compile and collate the information, annually.

Since 1 April 2000 Commission Regulation (EC) No 645/2000[11] is in force, which provides for detailed implementing rules for the monitoring provisions of Directives 86/362/EEC and 90/642/EEC.

3. MAXIMUM RESIDUE LIMITS (MRL), ACCEPTABLE DAILY INTAKES (ADI) AND ACUTE REFERENCE DOSES (ACUTE RFD)

Pesticide residue levels in foodstuffs are generally regulated in order to:

- minimise the exposure of consumers to the harmful intake of pesticides;
- control the correct use of pesticides in terms of the authorisations or registrations granted (application rates and pre-harvest intervals);
- permit the free circulation within the EU of products treated with pesticides as long as they comply with the MRLs fixed.

A maximum residue limit (MRL) for pesticide residues is the maximum concentration of a pesticide residue (expressed in mg/kg) legally permitted in or on food commodities and animal feed. MRLs are based on Good Agricultural Practice (GAP) data. Foods derived from commodities that comply with the respective MRLs are intended to be toxicologically acceptable. Exceeded MRLs are indicators of violations of Good Agricultural Practice. If MRLs are exceeded, comparison of the exposure with acceptable daily intake (ADI) and/or acute reference dose (acute RfD) will then indicate whether or not there are possible chronic or acute health risks, respectively.

The acceptable daily intake (ADI) is the estimate of the amount of a substance in food, expressed on a body-weight basis, that can be ingested daily over a lifetime without appreciable health risk to the consumer. The ADI is based on the no observed adverse effect levels (NOAEL) in animal testing. A safety factor that takes into consideration the type of effect, the severity or reversibility of the effect, and the inter- and intra-species variability is applied to the NOAEL. The ADI therefore reflects chronic toxicity.

The acute Reference Dose (acute RfD) is the estimate of the amount of a substance in food, expressed on a body-weight basis, that can be ingested over a short period of time, usually during one meal or one day, without appreciable health risk to the consumer. It therefore reflects the acute toxicity. At present, acute Reference Doses have been fixed for a limited number of pesticides.

[11] Commission Regulation (EC) No 645/2000 of 28 March 2000, Official Journal No. L 78, 29/03/2000, p. 0007 - 0009

4. NATIONAL MONITORING PROGRAMMES

4.1. Monitoring results for 2002

The overall results of the 18 national monitoring programmes are shown in Tables 1 - 6. In total for the EU and EEA as a whole, about 46,000 samples were analysed for, on average, 170 different pesticides. 58 % of the samples contained no detectable pesticide residues. Detectable residues at or below the MRL were found in 37 % of the samples. In 5.2 % of the samples, the residues exceeded MRLs (both national and EC-MRLs). The reported data show that there were confirmed exceedances[12] of EC-MRLs in 3.4 % of all samples (sum of fresh, frozen and processed products).

The results vary significantly between the different countries. It is important to note that differences between countries in the actual presence of pesticide residues can exist, but that differences in the monitoring programmes as such are very likely to account for an important part of the variation.

Several factors can cause these differences in the monitoring programmes:

- The choice of pesticides investigated in different commodities
- Sampling, e.g. more random or more targeted and the proportion of domestic and imported foodstuffs
- Methods used, e.g. the use of single methods to detect specific, often problematic pesticides
- Analytical capabilities of the laboratories (differences in reporting levels)
- Definition of exceeded levels (e.g. including or excluding analytical uncertainty)
- Differences in national MRLs, leading to differences in exceeded levels reported

Surveillance sampling versus follow-up enforcement sampling

Surveillance and follow-up enforcement sampling are distinguished, since a different sampling strategy (more or less targeted) can lead to considerably different results, due to the more targeted nature of the follow-up enforcement sampling.

In the guidance document (SANCO/11/2003) for reporting the results of the 2002 national and Community monitoring programmes to the European Commission, surveillance and follow-up enforcement sampling were defined as follows:

Surveillance sampling means that samples are collected without any particular suspicion towards a particular producer, consignment, etc. Surveillance sampling may also include more targeted samples, which are directed to a special problem, e.g. methamidophos in

[12] The definition of confirmed exceedances varies between Member States, this includes for example cases where the analytical laboratory has certified an exceedance when applying its quality assurance system, cases where official warnings have been issued or where legal or administrative consequences have followed.

peppers or chlormequat in pears from countries where previously problems were found. Samples directed towards a special producer or consignment, however, fall within the category of follow-up enforcement sampling.

Follow-up enforcement sampling means that samples are taken in case of suspicion, as a follow-up for previously found violations. Follow-up enforcement sampling is directed to a specific grower/producer or to a specific consignment. Samples directed towards a specific problem, but not to a specific producer/consignment fall within the category of surveillance sampling.

Tables 1A and 1B give a general overview of surveillance and follow-up enforcement sampling and the number of samples taken for fresh (incl. frozen)[13] and processed products, respectively.

In Tables 2-6 the detailed results by country are shown. Table 2 gives a summary of all samples taken (fruit, vegetables and cereals, including both surveillance and follow-up enforcement samples). Table 3 and 4 relate to surveillance sampling only – for fruit and vegetables and for cereals, respectively. Table 5 shows follow up enforcement samples for fruit and vegetables only (as there were only 32 follow-up enforcement samples for cereals, of which 21 were without residues). Table 6 relates to processed products (surveillance sampling only, since there were only 24 follow-up enforcement samples for processed products, of which 21 were without residues). In Tables 2 and 3 the total sample numbers including processed products are given in the last row of the tables.

Table 1A: Overview of the samples analysed in 2002 in the EU and EEA States - Breakdown by surveillance and follow-up enforcement samples

Total number of samples analysed in EU and EEA	46152	
Surveillance samples	45458	98.5%
Follow-up enforcement samples	694	1.5%

Table 1A shows that 98.5 % of the samples were surveillance samples and 1.5 % were follow-up enforcement samples. The number of follow-up enforcement samples in 2002 has increased considerably by comparison with 2001 when they were 339, corresponding to 0.7 % of the total number of samples analysed.

As Tables 3 and 5 for fruit and vegetables show, the more targeted nature of follow-up enforcement sampling leads to a higher percentage of MRL exceedances on these samples (24 % compared to 5.5 % in the surveillance sampling).

[13] In this report fresh fruit and vegetables always include frozen fruit and vegetables, although this is not explicitly mentioned everywhere in the text.

Surveillance sampling of fresh fruit/vegetables versus surveillance sampling of cereals

For cereals, 2096 samples were analysed (Table 4), compared to 39,686 samples for fruit and vegetables (Table 3). A more restricted group of pesticides (average 107) was analysed for cereals than for fruit and vegetables (average 170) and the percentage of pesticides found as a share of those sought was lower (5 %, compared to 44 % for fruit and vegetables). Details of the pesticides most often found in both product groups are given in Table 8 (page19).

The percentage of samples without residues was considerably higher in cereals (75 %) than in fresh fruit and vegetables (56%). Consequently the percentage of samples with residues at or below the MRL and exceeding the MRL was lower in cereals at 24 % and 0.9 %, respectively, compared to 39 % and 5.5 % in fruit and vegetables.

Fresh versus processed products

Table 1B: Overview of the samples analysed in 2002 in the EU and EEA states - Breakdown by **fresh (incl. frozen)** and **processed** products

Total number of samples analysed in EU and EEA	46152	
Fresh fruit and vegetables	40324	87%
Cereals	2128	5%
Processed products	3700	8%

As indicated in Table 1B, 92 % of the samples taken in the EU and the EEA States were fresh (incl. frozen) fruit, vegetables and cereals. At 8%, the share of processed products has increased by 1 percentage point by comparison with 2001, when there were 3098 samples corresponding to 7% of total samples.

Out of 18 countries, 13 took samples of processed products, two countries more than in 2001, with the highest shares attributable to the UK (which took 23 % of all the processed products samples) and Italy (21%) (Table 6, page 14).

Comparing processed products with fresh products [14] the percentage of surveillance samples with residues at or below the MRL (national or EC-MRL) and with residues exceeding the MRL (national or EC-MRL) is significantly lower in processed products. Residues at or below the MRL were found in 27 % of the samples, compared to 38 % in fresh products; residues exceeding the MRL were found in 0.7 % of the samples, compared to 5.3 % in fresh products. As a consequence, the percentage of samples without residues is significantly higher in processed products (72 % compared to 57 % in fresh products).

Directives 86/362/EEC and 90/642/EEC contain general provisions for dried, processed and composite products, which specify that, in the absence of a specific MRL, the MRL for the

[14] In both tables surveillance sampling only

fresh product shall be applied, taking into account concentration or dilution factors caused by processing. Specific MRLs for processed products may or may not have been set at the national level and the general provisions of Directives 86/362/EEC and 90/642/EEC are applied differently by Member States.

Since the number of surveillance samples of processed products was low (3676 samples) compared to fresh products (41782 samples) the statistics do not change much when processed products are included in the overall table, Table 2, (last row) and in Table 3 (last row) for fruit and vegetables.

Table 2: Results of the eighteen national monitoring programmes[15] for pesticide residues on **fresh (incl. frozen) fruit, vegetables and cereals, sum of surveillance and enforcement** samples. The results **including processed products** are shown in the **last row** of the table.

	No. of samples analysed	No. of pesticides analysed for	No. of different pesticides found	% found from sought	No. of samples without detec-table residues	%	No. of samples with residues below or at MRL (national or EC MRLs)	%	No. of samples with residues above MRL (national or EC MRLs)	%	No. of samples with confirmed residues above EC-MRLs	%
B	1028	141	45	32	566	55	408	40	54	5.3	26	2.5
DK	1977	135	78	58	1179	60	745	38	53	2.7	48	2.4
D	7035	399	182	46	3226	46	3197	45	612	8.7	361	5.1
EL	1661	102	46	45	936	56	694	42	31	1.9	31	1.9
E	4049	182	76	42	2495	62	1401	35	153	3.8	142	3.5
F	3721	218	99	45	1743	47	1647	44	331	8.9	230	6.2
IRL	617	75	45	60	320	52	271	44	26	4.2	26	4.2
I	8095	260	137	53	5685	70	2284	28	126	1.6	91	1.1
L	118	50	28	56	71	60	43	36	4	3.4	2	1.7
NL	3042	332	117	35	1397	46	1146	38	499	16.4	250	8.2
A	1637	217	97	45	747	46	753	46	137	8.4	62	3.8
P	722	118	40	34	534	74	168	23	20	2.8	20	2.8
FIN	1985	171	89	52	981	49	916	46	88	4.4	81	4.1
S	2073	210	89	42	1208	58	775	37	90	4.3	82	4.0
UK	2087	184	76	41	1164	56	889	43	34	1.6	34	1.6
Norway	2280	165	64	39	1508	66	690	30	82	3.6	78	3.4
Iceland	278	40	26	65	147	53	124	45	7	2.5	7	2.5
Liechten-stein	47	55	3	5.5	38	81	8	17	1	2.1	0	0.0
Total	**42452**	**170**	**74**	**44**	**23945**	**56**	**16159**	**38**	**2348**	**5.5**	**1571**	**3.7**
Total *incl. processed products*	**46152**	**170 (Average)**	**74 (Average)**	**44**	**26618**	**58**	**17159**	**37**	**2375**	**5.1**	**1590**	**3.4**

[15] See the explanation about the differences in monitoring results by country under chapter 4.1.

Table 3: Results of the eighteen national monitoring programmes for pesticide residues on **fresh (incl. frozen) fruit, vegetables, surveillance sampling only.** The results including **processed products** are shown in the **last row** of the table.

	No. of samples analysed	**No. of pesticides analysed for**	**No. of different pesticides found**	**% found from sought**	**No. of samples without detectable residues**	**%**	**No. of samples with residues below or at MRL (national or EC MRLs)**	**%**	**No. of samples with residues above MRL (national or EC MRLs)**	**%**	**No. of samples with confirmed residues above EC-MRLs**	**%**
B	1000	141	45	32	544	54	402	40	54	5.4	26	2.6
DK	1845	135	78	58	1078	58	714	39	53	2.9	48	2.6
D	6528	399	182	46	2847	44	3084	47	597	9.1	348	5.3
EL	1659	102	46	45	934	56	694	42	31	1.9	31	1.9
E	3811	182	76	42	2275	60	1390	36	146	3.8	135	3.5
F	3312	218	99	45	1605	48	1448	44	259	7.8	194	5.9
IRL	559	75	45	60	270	48	263	47	26	4.7	26	4.7
I	7660	260	137	53	5292	69	2245	29	123	1.6	89	1.2
L	118	50	28	56	71	60	43	36	4	3.4	2	1.7
NL	2943	332	117	35	1344	46	1133	38	466	15.8	221	7.5
A	1628	217	97	45	739	45	752	46	137	8.4	62	3.8
P	670	118	40	34	493	74	158	24	19	2.8	19	2.8
FIN	1722	171	89	52	852	49	806	47	64	3.7	59	3.4
S	1770	210	89	42	1003	57	690	39	77	4.4	73	4.1
UK	1995	184	76	41	1126	56	837	42	32	1.6	32	1.6
Norway	2146	165	64	39	1435	67	634	30	77	3.6	73	3.4
Iceland	278	40	26	65	147	53	124	45	7	2.5	7	2.5
Liechten-stein	42	55	3	5.5	33	79	8	19	1	2.4	0	0.0
Total	39686	**170**	**74**	**44**	22088	56	15425	39	2173	5.5	1445	3.6
Total *incl. processed products*	43362	**170 (Average)**	**74 (Average)**	**44**	24740	57	16424	38	2198	5.1	1462	3.4

Table 4: Results of the eighteen national monitoring programmes for pesticide residues on **cereals, surveillance sampling only.**

	No. of samples analysed	No. of pesticides analysed for	No. of different pesticides found	% found from sought	No. of samples without detectable residues	%	No. of samples with residues below or at MRL (national or EC MRLs)	%	No. of samples with residues above MRL (national or EC MRLs)	%	No. of samples with confirmed residues above EC-MRLs	%
B	28	19	4	21	22	79	6	21	0	0	0	0
DK	132	82	6	7.3	101	77	31	23	0	0	0	0
D	357	373	21	5.6	266	75	84	24	7	2.0	5	1.4
EL	2	7	0	0	2	100	0	0	0	0	0	0
E	238	80	6	7.5	220	92	11	5	7	2.9	7	2.9
F	186	140	8	5.7	71	38	115	62	0	0	0	0
IRL	47	75	1	1.3	46	98	1	2	0	0	0	0
I	435	228	13	5.7	393	90	39	9	3	0.7	2	0.5
L	0	0	0	0	0	0	0	0	0	0	0	0
NL	50	329	3	0.9	42	84	8	16	0	0	0	0
A	9	160	2	1.3	8	89	1	11	0	0	0	0
P	51	95	5	5.3	40	78	10	20	1	2.0	1	2.0
FIN	134	159	5	3.1	90	67	43	32	1	0.7	1	0.7
S	231	46	10	22	172	74	59	26	0	0	0	0
UK	72	32	3	9.4	20	28	52	72	0	0	0	0
Norway	119	53	8	15	70	59	49	41	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0
Liechtenstein	5	41	0	0	5	100	0	0	0	0	0	0
Total	**2096**	**107 (Average)**	**5 (Average)**	**5**	**1568**	**75**	**509**	**24**	**19**	**0.9**	**16**	**0.8**

Table 5: Results of the eighteen national monitoring programmes for pesticide residues on **fresh (incl. Frozen) fruit and vegetables, enforcement sampling only.**

	No. of samples analysed	No. of samples without detectable residues	%	No. of samples with residues below or at MRL (national or EC MRLs)	%	No. of samples with residues above MRL (national or EC MRLs)	%	No. of samples with confirmed residues above EC-MRLs	%
B	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0
D	127	93	73	27	21	7	5.5	7	5.5
EL	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0
F	223	67	30	84	38	72	32	36	16.1
IRL	11	4	36	7	64	0	0.0	0	0.0
I	0	0	0	0	0	0	0	0	0
L	0	0	0	0	0	0	0	0	0
NL	49	11	22	5	10	33	67	29	59
A	0	0	0	0	0	0	0	0	0
P	1	1	100	0	0	0	0	0	0
FIN	120	34	28	63	53	23	19.2	21	17.5
S	72	33	46	26	36	13	18	9	13
UK	20	18	90	0	0	2	10.0	2	10.0
Norway	15	3	20	7	47	5	33	5	33
Iceland	0	0	0	0	0	0	0	0	0
Liechtenstein	0	0	0	0	0	0	0	0	0
Total	**638**	**264**	**41**	**219**	**34**	**155**	**24**	**109**	**17**

Table 6: Results of the eighteen national monitoring programmes for pesticide residues in **processed products, surveillance sampling only.**

	No. of samples analysed	No. of samples without detec-table residues	%	No. of samples with residues below or at MRL (national or EC MRLs)	%	No. of samples with residues above MRL (national or EC MRLs)	%	No. of samples with confirmed residues above EC-MRLs	%
B	54	45	83	8	15	1	1.9	1	1.9
DK	170	151	89	19	11	0	0.0	0	0.0
D	0	0	0	0	0	0	0	0	0
EL[16]	400	181	45	213	53	6	1.5	1	0.3
E	0	0	0	0	0	0	0	0	0
F	52	15	29	37	71	0	0.0	0	0.0
IRL	0	0	0	0	0	0	0	0	0
I[17]	787	450	57	337	43	0	0.0	0	0.0
L	7	7	0	0	0	0	0	0	0
NL	282	250	89	32	11	0	0.0	0	0.0
A	0	0	0	0	0	0	0	0	0
P	109	88	81	21	19	0	0.0	0	0.0
FIN	320	252	79	65	20	3	0.9	0	0.0
S	296	254	86	41	14	1	0.3	1	0.3
UK	863	652	76	208	24	3	0.3	3	0.3
Norway	321	292	91	18	6	11	3.4	11	3.4
Iceland	15	15	0	0	0	0	0	0	0
Liechten-stein	0	0	0	0	0	0	0	0	0
Total	**3676**	**2652**	**72**	**999**	**27**	**25**	**0.7**	**17**	**0.5**

[16] All samples of olive oil

[17] Oil and wine, respectively 168 and 619 samples analysed

4.2. Results of the 2002 national monitoring programmes compared to the previous years

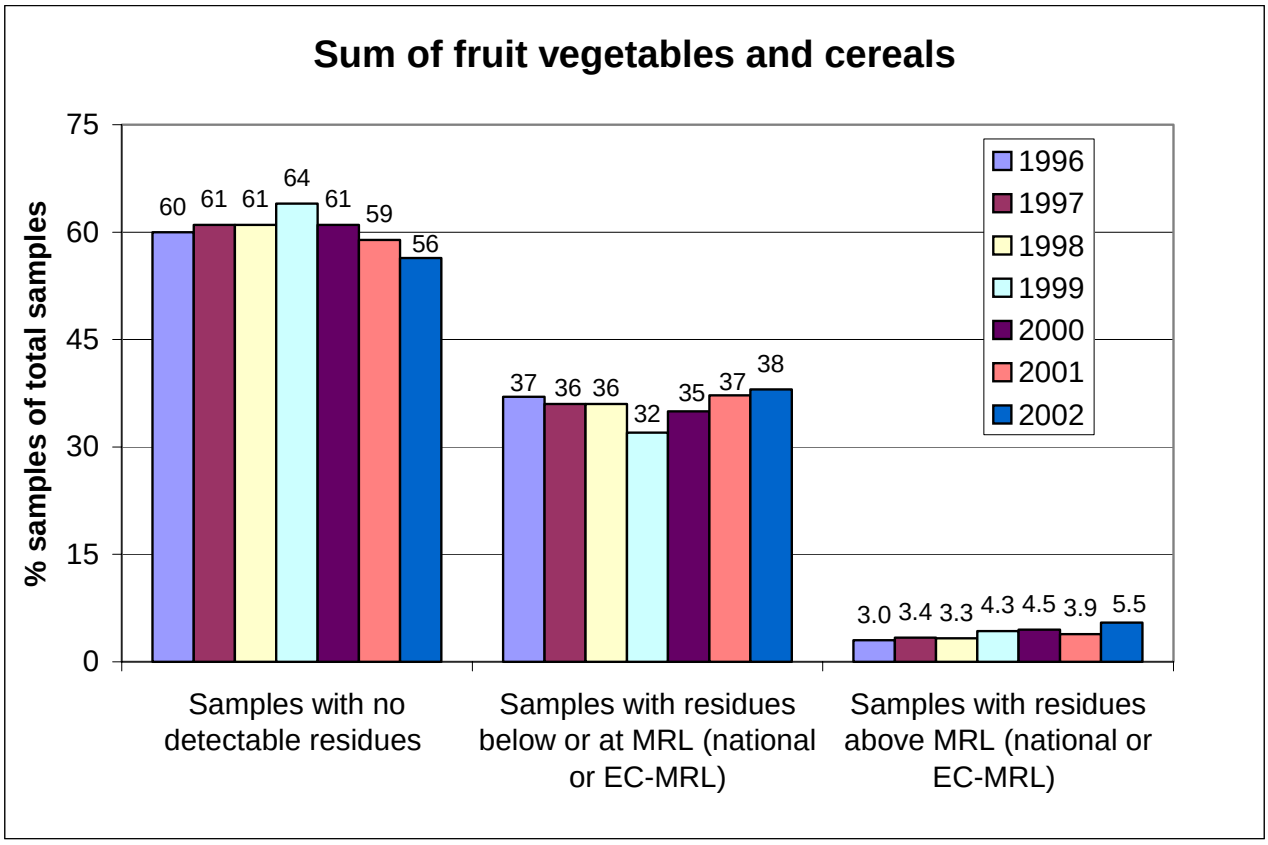

Figure 1: National monitoring results 1996 – 2002 for fruit, vegetables and cereals (sum of surveillance and follow-up enforcement sampling, fresh (incl. frozen) products only) collected in 18 participating countries

Figure 1 gives an overview of the trend in the residue situation since 1996. Only the results for fresh (incl. frozen) fruit, vegetables and cereals are shown, since processed products have not always been reported in previous years. There is no clearcut trend in the occurrence of residues over the last 7 years, but a certain tendency in the last 4 years can be noted in the increased percentage of samples with detectable residues and a consequent fall in the % of samples with no detectable residues.

The figure shows that the percentage of samples with no detectable residues remained at the same level in the years 1996 - 1998 (60 - 61 %), then increased to 64 % in 1999. After this peak, the % has decreased steadily and in 2002 the percentage of samples with no detectable residues was 56%.

The % of samples with residues above the MRL (national or EC-MRL) increased in 2002 compared to 2001 from 3.9 % to 5.5 %, which is the highest level reached since 1996.

A number of factors might have contributed to this evolution: first of all, as outlined in chapter 4.1, the national monitoring programmes differ considerably from year to year. In most countries, priorities for the monitoring programmes are set annually at national level and are often targeted at specific problems, such as for instance the information received on infringements in the EU (e.g. disseminated via the Rapid Alert System for Food and Feed (RASFF)) and on their national territory detected in their previous' years programmes. The more information that is available and the more effective information systems (such as the RASFF) work, the more precisely the programmes can detect potential problems.

Secondly, the quality of the analytical laboratories is constantly improving towards lower detection limits and lower reporting levels, towards enhanced capability to analyse more active ingredients and towards development and use of more specific single residue methods. In 1997, on average 126 active ingredients were analysed, ranging from 28 to 130 in the different countries. In 2001 the average figure was 145 (ranging from 32 to 314), while in 2002 it is 170 (ranging from 40 to 399). The progress in the implementation of the EU QC procedures made in most of the participating countries may also have contributed to improvements in the analytical capability and results.

Finally, comparability of the 1996 - 2002 data is somewhat limited also by the fact that the number of countries included in the reports was not the same over the period.

It should also be mentioned that the legislative situation has changed rapidly in recent years and will change in future with more MRLs set to the Limit of determination (LOD)[18], which could potentially result in more MRL exceedances.

[18] LOD is the limit of determination, also known as limit of quantification, it is the minimum concentration or mass of the analyte that can be quantified with acceptable precision (EU Quality Control procedures for pesticides residues).

4.3. Samples with multiple residues

Table 7 shows that residues of more than one pesticide were found in about 21 % of the analysed samples. In most of these cases(10.1 %), residues of two pesticides were found, while 5.2 % of samples contained residues of three pesticides.

Table 7: Samples with residues of more than one pesticide in fresh (incl. frozen) fruit, vegetables and cereals, sum of surveillance and follow-up enforcement sampling

	No. of samples analysed	**2**	**3**	**4**	**5**	**6**	**7**	**8 and more**	**No. of samples with multiple residues**	**%**
B	1028	104	34	13	3	2	0	0	156	15.2
DK	1977	216	84	30	11	4	4	1	350	17.7
D	7035	821	533	303	211	117	69	134	2188	31.1
EL	1661	92	25	11	1	0	0	0	129	7.8
E	4049	228	79	39	1	0	0	0	347	8.6
F	3721	539	292	153	77	29	16	5	1111	29.9
IRL	617	69	26	12	4	1	0	0	112	18.2
I	8095	590	290	141	67	24	13	6	1131	14.0
L	118	8	4	2	0	0	0	0	14	11.9
NL	3042	347	273	136	67	47	32	45	947	31.1
A	1637	219	116	71	33	15	8	16	478	29.2
P	722	44	17	5	1	2	0	0	69	9.6
FIN	1985	286	158	73	27	4	1	1	550	27.7
S	2073	232	86	36	12	0	1	0	367	17.7
UK	2087	262	93	45	24	5	3	1	433	20.7
Norway	2280	217	90	36	6	2	2	0	353	15.5
Iceland	278	26	18	11	6	5	0	0	66	23.7
Liechten -stein	47	0	0	0	0	0	0	0	0	0.0
Total	**42452**	**4300**	**2218**	**1117**	**551**	**257**	**149**	**209**	**8801**	**20.7**
%		**10.1**	**5.2**	**2.6**	**1.30**	**0.61**	**0.35**	**0.492**		

Samples with multiple residues in the years 1996 - 2002

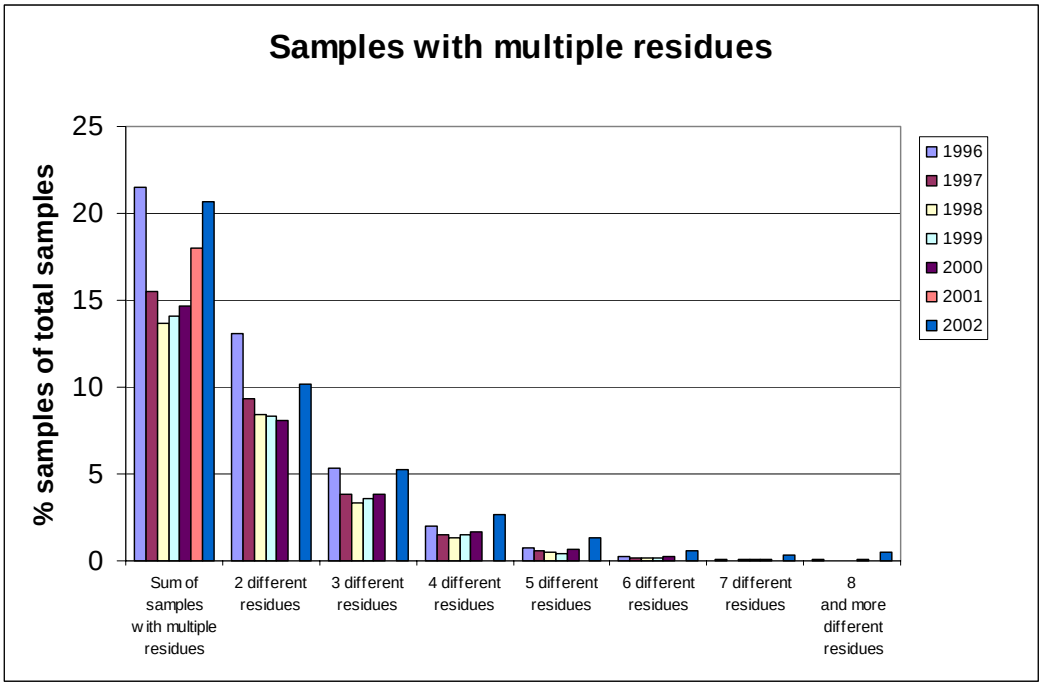

Figure 2: Samples with multiple residues - Comparison of the years 1996 - 2002, fresh (incl. frozen) fruit, vegetables and cereals only, sum of surveillance and enforcement sampling – In 2001 Italy provided only the total number of samples with multiple residues and for this reason detailed data are missing.

Figure 2 gives an overview of the distribution of samples with multiple residues in the years from 1996 to 2002. To facilitate comparison, only fresh fruit, vegetables and cereals have been taken into account. The chart shows that the number of samples with multiple residues decreased from 1996 to 1998, which can be seen throughout the different groups (e.g. samples with 2 residues, samples with 3 residues, etc.). From 1999 onwards the number of samples with multiple residues has increased.

However, when evaluating these data, it must be noted that the results are not directly comparable over the period: in 1996 only eleven countries delivered data for this overview, in 1997 and 1998 fifteen countries, in 1999 sixteen countries and from 2000 onwards all eighteen countries delivered data.

Furthermore, factors outlined in chapter 4.2. are also relevant to explain an increased trend in detection of multiple residues.

4.4. Most frequently found pesticides

The pesticides which have been most frequently found in the national monitoring programmes are shown in Table 8, in decreasing order of relative frequency. The Member States, Norway, Iceland and Liechtenstein were asked to prepare a list of the ten most frequently found pesticides in decreasing order of frequency. This list was established by calculating the percentages of the findings of each pesticide in relation to the total number of samples analysed for this specific pesticide. The data are as reported by the respective country.

Table 8: Pesticides found most often in the national (incl.co-ordinated) monitoring programmes in the European Union, Norway, Iceland and Liechtenstein for a) fruit and vegetables and b) cereals, as reported.

Country	**Pesticides found most often. The last row lists the pesticides mentioned most often from all Member States and Norway, Iceland and Liechtenstein**	
	Fruit and vegetables	**Cereals**
B	Chlormequat, Bromide, Imazalil, Ethephon, Propamocarb, Maneb group, Chlorpropham, Benomyl group, Thiabendazole and Iprodione	Dichlorvos, Chlorpyriphos-methyl, Pirimiphos-methyl and Malathion
DK	Chlormequat, Imazalil, Pyrimethanil, Maneb group, Procymidone, Chlorpyriphos, Iprodione, Dicofol, Thiabendazole and 2-Phenylphenol	Chlormequat, Glyphosate, Deltamethrin, Fenitrothion, Malathion and Pirimiphos-methyl
D	Bromide sum, Chlormequat, Maneb group, Amitraz sum, Chlorpyriphos, Benomyl group, Cyprodinil, Procymidone, Thiabendazole and Fenhexamid	Hydrogen cyanide, Bromide sum, Chlormequat, Ethephon, Pirimiphos-methyl, Flurtamone, Phosphides / PH3, DDT Sum, Epoxiconacole and Chlormequat
EL	Maneb group, Benomyl group, Iprodione, Chlorpyriphos, Phosalone, Captan, Endosulfan, Procymidone, Cypermethrin and Dicofol	None found
E	Chlorpyriphos, Procymidone, Endosulfan, Imazalil, Maneb group, Malathion, Methidathion, Dicofol, Chlorothalonil and Pirimiphos-methyl	Maneb group, Malathion, Pirimiphos-methyl, Chlormephos, Fenitrothion and Propizamide
F	Thiabendazole, Benomyl group, Maneb group, Iprodione, Imazalil, Procymidone, Maleic-hydrazide, Chlorpropham, Chlorpyriphos and Orthophenylphenol.	Malathion, Pirimiphos-methyl, Chlorpyriphos-methyl, Dichlorvos, Deltamethrin, Piperonyl-butoxide, Gamma HCH and Endosulfan
IRL	Thiabendazole, Benomyl group, Captan, Methidathion, Chlorpyriphos, Iprodione, Folpet, Bromopropylate, Tolylfluanid and Malathion	Malathion
I	Copper, Sodium metabisulphite, Metam (sodium), Fenbuconazole, Chlorpyriphos, Procymidone, Azimsulfuron, Ethofenprox, Chlormequat (chloride) and Imazalil	Pirimiphos-methyl, Piperonyl-butoxide, Deltamethrin, Dichlorvos, Cypermethrin, Carbaryl, Chlorpyriphos-methyl, Malathion, Hexachlorocyclohexane and Permethrin

Country	Pesticides found most often. The last row lists the pesticides mentioned most often from all Member States and Norway, Iceland and Liechtenstein	
	Fruit and vegetables	**Cereals**
L	Folpet, Chlorpropham, Orthophenylphenol, Iprodione, Pyrimethanil, Brompropylate, Captan, Maneb group, Parathion-methyl and Chlorpyriphos	No data.
NL	Chlormequat, Maneb group, Iprodione, Imazalil, Benomyl group, Procymidone, Thiabendazole, Cyprodinil, Chlorpyriphos-ethyl and Endosulfan	Pirimiphos-methyl, Malathion and Dichlorvos
A	Maneb group, Procymidone, Endosulfan, Chlormequat, Iprodione, Tebuconazole, Chlorpyriphos, Pirimiphos-methyl, Brompropylate and Cyprodinil	Deltamethrin and Pirimiphos-methyl
P	Phosmet, Maneb group, Dimethoate, Benomyl group, Captan, Procymidone, Thiabendazole, Iprodione, Endosulfan and Chlorpyriphos	Malathion, Deltamethrin, Dichlorvos, Pirimiphos-methyl and Chlorpyriphos-methyl
FIN	Diquat, Maleic-hydrazide, Dithianon, 2-phenylphenol, Bromide (inorganic), Chlormequat, Benomyl group, Imazalil, Hydrogen phosphide and Thiabendazole	Hydrogen phosphide, Chlormequat, Bromide (inorganic), Pirimiphos-methyl and Malathion
S	Diquat, Maneb group, Chlormequat, Bromide (inorganic), Imazalil, Thiabendazole, Maleic-hydrazide, Benomyl group, Phosphine and Iprodione	Chlormequat, Mepiquat, Phosphine, Glyphosate, Pirimiphos-methyl, Bromide (inorganic), Chlorpyriphos-methyl, Deltamethrin, Fenitrothion and Malathion
UK	2,4-D, Bromide (inorganic), Diphenylamine, Chlorpropham, Imazalil, Chlormequat, 2-phenylphenol, Maleic-hydrazide, Maneb group and Propamocarb	Chlormequat, Pirimiphos-methyl and Glyphosate
Norway	2,4-D, Maneb group, Chlormequat, Orthophenylphenol, Imazalil, Propargite, Propamocarb, Thiabendazole, Iprodione and Benomyl group	Chlormequat, Glyphosate, AMPA (aminomethyl-phosphonic acid), Pirimiphos-methyl, Malathion, Mepiquat, Chlorpyriphos-methyl and Chlorpyriphos
Iceland	Imazalil, Thiabendazole, Orthophenylphenol, Chlorpyriphos, Dicofol, Iprodione, Methidathion, Diphenylamine, Procymidone and Malathion	No data.
Liechten-stein	Maneb group, Diazinon and Thiabendazole	None found.
EU, NOR, ICE and LIE	Maneb group, Chlormequat, Imazalil, Thiabendazole, Iprodione, Benomyl group, Chlorpyriphos, Procymidone, Bromide and Orthophenylphenol	Pirimiphos-methyl, Malathion, Chlormequat, Deltamethrin, Dichlorvos, Chlorpyriphos-methyl, Glyphosate, Bromide, Fenitrothion and Mepiquat

Table 8 shows that the most frequently found pesticides on fruit and vegetables were mainly fungicides. On cereals, the pesticides found were mainly insecticides. In both cases, this confirms the findings of previous years.

In the year 2002, the great majority of the ten most frequently found pesticides was identical to 2001 both for fruit and vegetables and cereals.

Prior to 2000, the absolute number of findings was reported whereas, from 2000 onwards, the relative frequency of pesticides occurrences was reported. The separation into the two categories fruit and vegetables and cereals was introduced in 2001. These changes limit somewhat the comparability of the data over time.

5. THE EU CO-ORDINATED MONITORING EXERCISE

As an EU co-ordinated monitoring exercise, the Commission recommended in 2002 via Commission Recommendation 2002/1/EC that eight commodities should be tested (pears, bananas, beans fresh or frozen, potatoes, carrots, oranges/mandarins, peaches/nectarines, spinach fresh or frozen) for 41 pesticides (acephate, aldicarb, azinphos-methyl, azoxystrobin, benomyl group, bromopropylate, captan, chlorothalonil, chlorpyriphos, chlorpyriphos-methyl, cypermethrin, deltamethrin, diazinon, dichlofluanid, dicofol, dimethoate, endosulfan, folpet, imazalil, iprodione, lamba-cyhalothrin, malathion, maneb-group, mecarbam, methamidophos, metalaxyl, methidathion, methiocarb, methomyl, omethoate, oxydemeton-methyl, parathion, permethrin, phorate, pirimiphos-methyl, procymidone, propyzamide, thiabendazole, tolylfluanid, triazophos and vinclozolin). The 41 pesticides analysed included 34 of the 36 analysed in 2001, but did not include disulfoton and thiometon, which were not detected in 2001. To these 34 were added 7 additional substances.

The list of pesticides has been extended substantially compared to previous years and comprises all the 20 pesticides analysed from 1998 to 2000 plus another 21. It also includes all the pesticides analysed in 1996 and 1997, apart from DDT, which was analysed only in 1997.

The benomyl-group comprises three different compounds (benomyl, carbendazim, thiophanate-methyl), which are analysed with the same analytical method and determined as sum of residues expressed as carbendazim. The maneb-group, by legal definition, comprises five different dithiocarbamates, which are also determined as a sum, expressed as CS_2.

All Member States and EEA States participated in the EU co-ordinated programme. Overall, 10,046 samples were analysed (1330 samples of pears, 883 of bananas, 896 of beans, 1502 of potatoes, 1457 of carrots, 2144 of oranges/mandarins, 1190 of peaches/nectarines and 644 of spinach). The number is slightly increased with respect to 2001 and is about twice the number of samples of years prior to that. However, not all samples were analysed for all 41 pesticides.

5.1. Sampling design applied in the 2002 EU co-ordinated monitoring programme

5.1.1. Description of the sampling design

In order to achieve reliable information concerning the concentration of pesticides in fruit, vegetables and cereals on the European market a suitable sampling plan is required. According to Commission Recommendation 2002/1/EC, each participating country has to take the minimum number of samples specified in the Annex (see Table 9).

The sampling design of the co-ordinated programme is based on a statistical method proposed by Codex Alimentarius[19]. Based on a binomial probability distribution it can be calculated that examination of a total sample number of 459 gives a 99 % confidence of detecting one sample containing pesticides above a specific level if it is anticipated that 1 % of products of plant origin will contain residues above this specific level. This level could be the reporting level[20] or the MRL.

The minimum numbers of samples to be taken of each commodity were fixed at a different level for each country, according to their population and consumer numbers, since adjusting the sample size to the size of the national markets improves the precision of the sampling design. The required number of samples varied from 12 to 93, resulting in a recommended total of 460 samples for all Member States and 496 samples for all Participating countries (i.e. incl. EEA States). This procedure was the same as in the previous exercises. In 2002, the recommended minimum number of samples was taken in most cases and in many cases even more samples were taken than recommended. However, Iceland and Liechtenstein did not take the required sample numbers for most of the commodities. Table 9 shows the recommended minimum number of samples by country compared to the number of samples actually taken.

Table 9: Numbers of samples taken by Country for each commodity

Country	Recommen-ded minimum number of samples (for each commodity)	Number of samples taken by commodity							
		Pears	Bananas	Beans	Potatoes	Carrots	Oranges/ Mandarins	Peaches/ Nectarines	Spinach
B	12	38	38	37	47	36	38	37	25
DK	12	59	75	12	100	75	134	34	11
D	93	213	171	134	266	318	453	207	123
EL	12	28	15	57	23	18	69	14	16
E	45	45	50	45	48	43	45	45	45
F	66	116	94	110	243	246	195	136	64
IRL	12	24	12	12	25	26	95	21	12
I	65	267	67	28	171	187	241	305	56
L	12	12	12	12	16	12	12	12	12
NL	17	74	23	193	43	55	147	75	39
A	12	12	13	12	12	12	14	12	12
P	12	53	37	77	51	60	63	88	73
FIN	12	37	13	21	37	39	225	20	18
S	12	130	84	30	93	79	121	54	31

[19] Codex Alimentarius, Pesticide Residues in Foodstuffs, Rome 1994, ISBN 92-5-20372271-1; Vol. 2, p. 372

[20] The reporting level is the routinely achievable limit of quantification (lowest level at which residues will be reported as absolute numbers) for the monitoring laboratories and normally corresponds to the lowest calibrated level.

Country	Recommended minimum number of samples (for each commodity)	Number of samples taken by commodity							
		Pears	Bananas	Beans	Potatoes	Carrots	Oranges/ Mandarins	Peaches/ Nectarines	Spinach
UK	66	156	120	72	241	120	144	97	72
Total EU	**460**	**1264**	**824**	**852**	**1416**	**1326**	**1996**	**1157**	**609**
Norway	12	53	43	41	65	121	105	24	31
Iceland	12	10	13	0	15	7	40	6	1
Liechtenstein	12	3	3	3	6	3	3	3	3
Total EU and EEA	**496**	**1330**	**883**	**896**	**1502**	**1457**	**2144**	**1190**	**644**

5.1.2. Statistical evaluation of the results of the co-ordinated exercise

As described in section 5.1.1, the statistical approach of Codex Alimentarius requires that at least one sample of the whole number of samples must contain a specific concentration of a certain pesticide (e.g. above the reporting level or above the MRL), in order to assess the lowest portion of food items containing pesticides above this specific level in the whole population. In the following section, this lowest portion shall be estimated on a 95 % confidence level for each of the 40 pesticides[21].

The portion of samples with residues below or at the MRL (grey columns) or exceeding the MRL (white columns) of the respective pesticide are shown in Figures 3, 4, 5 and 6 (page 25-26). The results are presented in a logarithmic scale in order to accommodate a broad range of data in the figures. In addition, the corresponding confidence interval on the 95 % level is shown, reflecting the sampling error. The sampling error, in this context, reflects the variability of the data due to the different numbers of samples taken for the determination of the respective pesticide. Other error sources, such as how and when the samples were taken are not included in this estimation.

The impact of the sampling error on the final result can be illustrated using the reported concentrations of the maneb-group in the food items. 5080 samples were analysed and 450 of them showed residues below or at the MRL. The number of 5080 samples represents only a part of the whole European market, therefore the calculated fraction of samples with residues below or at the MRL (450/5080 = 8.85 %) is only an estimate for the true but unknown value. The variability of this value can be calculated and is expressed in terms of % samples, shown as error bars in Figures 3-6. For the example of the maneb-group, this means that the true value of the number of samples with residues at or below the MRL would vary between 409 and 494 samples, which corresponds to a range of 8.1% to 9.7 %.

[21] 41 pesticides were analysed but the results for captan and folpet were combined, because the MRL relates to the sum of captan and folpet

The relative sampling error increases with decreasing numbers of samples of a certain category. For cases where no samples with exceeding MRLs have been found, those error bars reflect the actual percentage of the specific commodity in the whole population, which still could contain residues above the MRL. For example, no sample with residues exceeding the MRL for aldicarb was found in the co-ordinated monitoring exercise, but the upper limit of the error range is 0.11 %, which means that 0.11 % of the specific commodities in the whole population (European market) could have residues exceeding MRLs for aldicarb. This upper limit of the error range for the 9 pesticides, for which no residues exceeding the MRL have been found (aldicarb, chlorpyriphos-methyl, dichlofluanid, lambda-cyhalothrin, malathion, methidathion, permethrin, pirimiphos-methyl and tolylfluanid) varied from 0.05 to 0.12 %. The exact value depended on the number of samples included (ranging from 3422 to 9359 for the individual pesticides) but the indicated range was considered as very low. This ensures sufficient precision of the results and allows for subsequent risk analysis calculations to be carried out.

In figures 3,4,5 and 6 the percentage of samples with residues at or below the MRL (national or EC-MRL) and exceeding the MRL (national or EC-MRL) for a specific pesticide, with the corresponding error bars is shown. A logarithmic scale is used in order to accommodate results of different orders of magnitudes in the same figures.

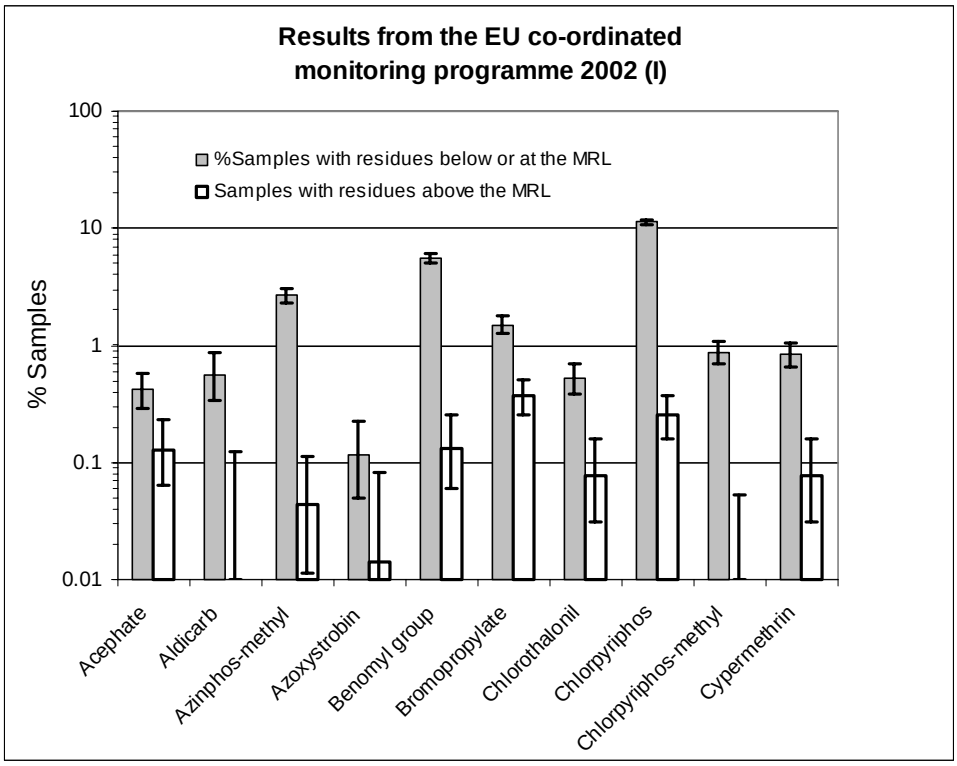

Figure 3: Results of the monitoring programme (I)

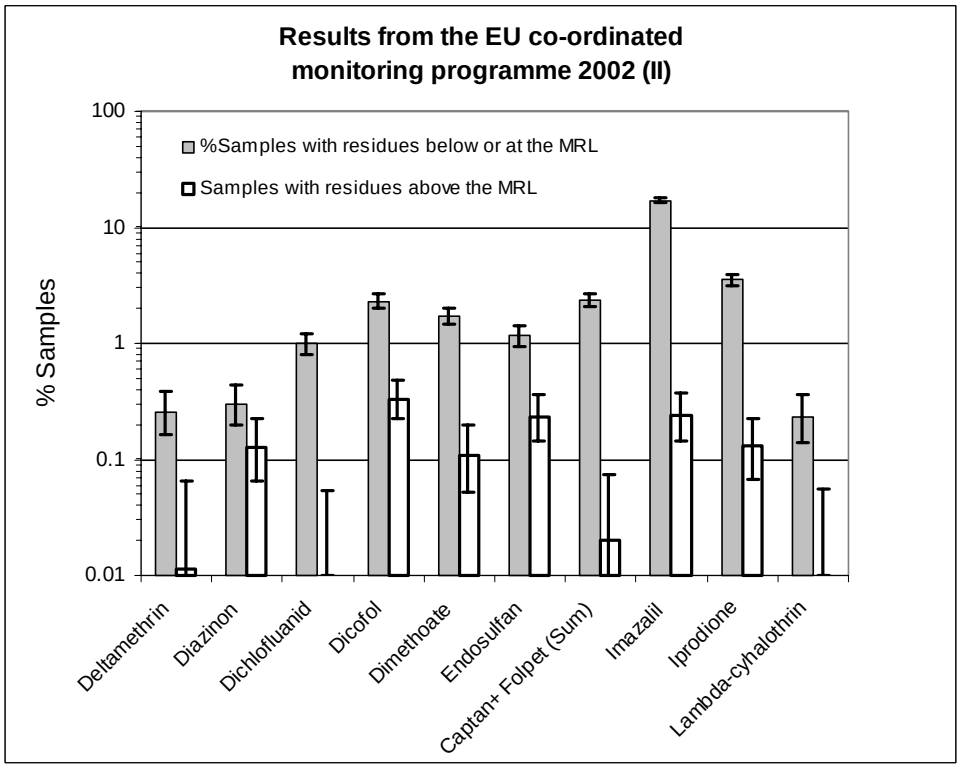

Figure 4:Results of the monitoring programme (II)

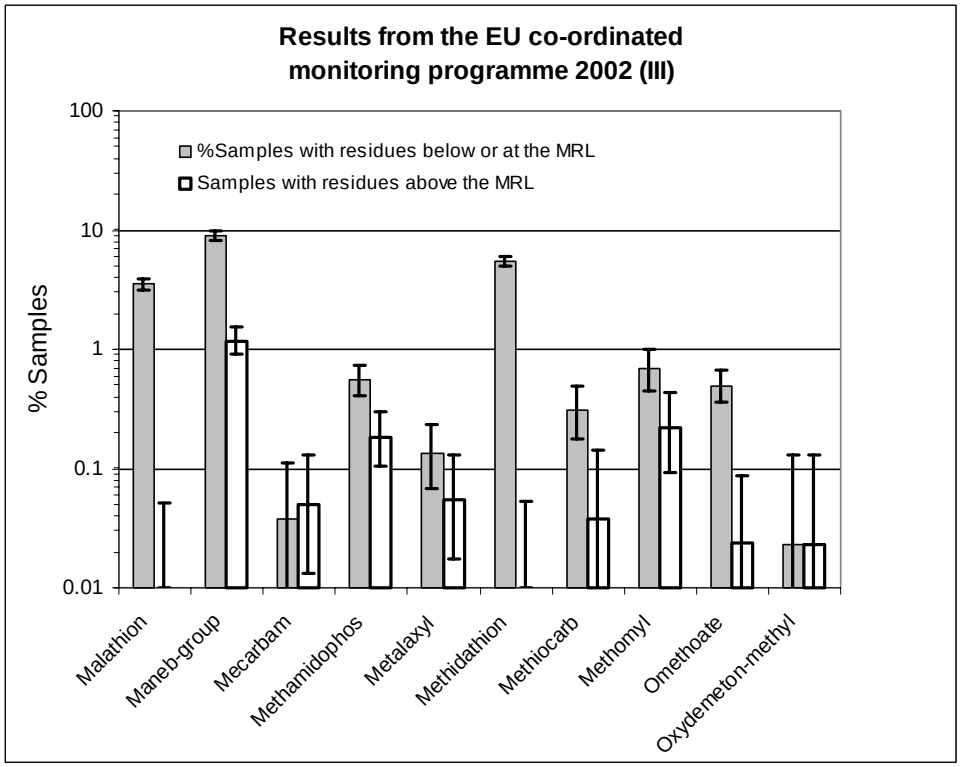

Figure 5:Results of the monitoring programme (III)

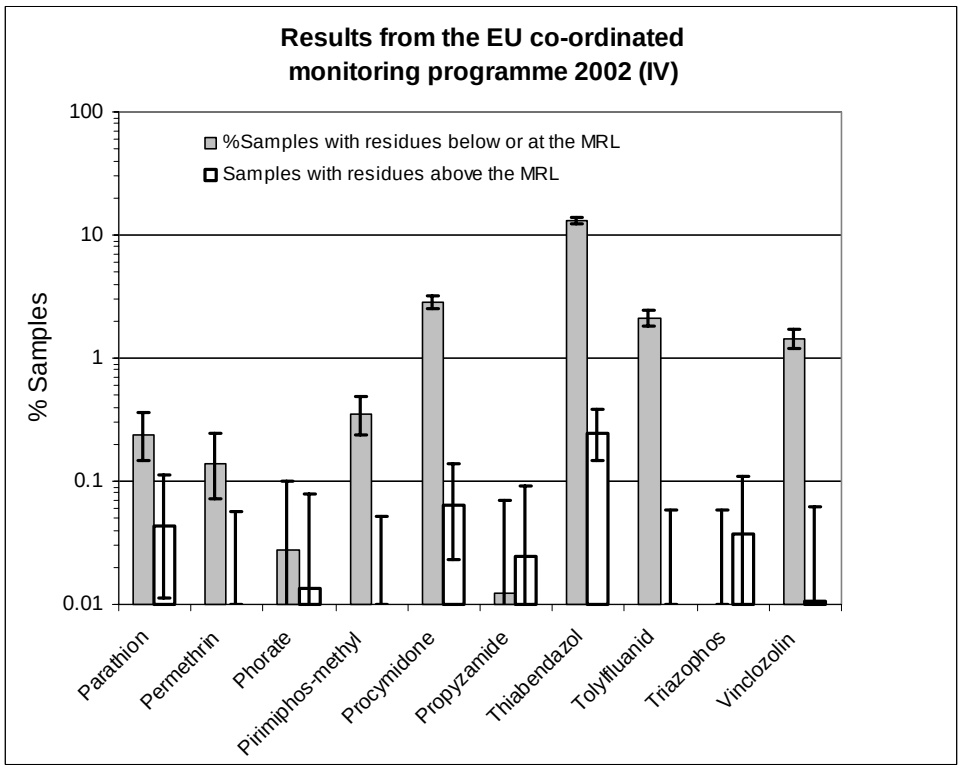

Figure 6:Results of the monitoring programme (IV)

5.2. Evaluation by pesticide

The summarised results for all 40[22] pesticides are given in Table 10. The Table also gives information on the highest residue of a particular pesticide found in a composite sample in this monitoring exercise. Table 11 shows a selection of the most important pesticide-commodity frequency combinations. More details can be found in Annex 2, where the complete results for all reporting countries and all commodities are given.

In the EU co-ordinated monitoring programme, residues of imazalil were found most often (17 %* of all samples analysed for the substance), followed by thiabendazole (13 %*), chlorpyriphos (11.5 %*), the maneb group (10 %*), benomyl group (5.7 %*) and methidathion (5.5 %*). Another group of pesticides had percentages varying from 1 % to under 4 %, among them iprodione (3.7 %*), malathion (3.5 %*), azinphos-methyl (2.7 %*), procymidone (2.68 %), dicofol (2.6 %*), captan+folpet (2.4 %*) and tolylfluanid (2.1 %*).

For the majority of pesticides, 23 out of 41, the frequency of samples with residues corresponded to less than 1 %.

The frequencies of exceedances for single pesticide detections are all below 1%, except for maneb-group, where 1.19% of all samples analysed exceeded MRL. The main other exceedances, in decreasing order are bromopropylate (0.37 %), dicofol (0.33 %), chlorpyriphos (0.25 %), thiabendazole (0.24 %), imazalil (0.24 %), endosulfan (0.23 %) and methomyl (0.22 %). For 9 substances no exceedance has been reported.

The highest residues found were 25 mg/kg for maneb group on spinach (EC-MRL: 0.05), 20 mg/kg for methiocarb on beans, 11 mg/kg for thiabendazole on oranges/mandarins (EC-MRL: 5), 10.80 mg/kg for methamidophos on beans (EC-MRL: 0.5), 8.9 mg/kg for imazalil on oranges/mandarins (EC-MRL: 5), 6.10 mg/kg for methomyl on spinach (EC-MRL: 2) and 6 mg/kg for chlorpyriphos on spinach (EC-MRL: 0.05).

Except for the maneb group, which exceeded MRLs most often in spinach (11.88 % of all samples), followed by bromopropylate in oranges (1.61 % of all samples) endosulfan in beans (1.58 % of all samples) iprodione in spinach (1.37 %) and metamidophos in beans (1.02 %) all the other exceedances of pesticides for specific commodities were below 1%.

Figures 7 and 8 illustrate the findings with regard to the 41 different pesticides in terms of exceedances and detections at or below the MRL.

[22] 41 pesticides were analysed but the results for Captan and Folpet were combined (see footnote 20)

* Percentages include sum of samples with residues at or below the MRL and exceeding the MRL.

Table 10: Results from the EU co-ordinated monitoring programme for pesticide residues for each pesticide analysed for in pears, bananas, beans, potatoes, carrots, oranges/mandarins, peaches/nectarines and spinach.

Pesticide	Total No. of samples	No. of samples without residues	No. of samples with residues below or at MRL	%	No. of samples with residues above MRL	%	Maximum residue found in mg/kg (commodity in which it was found and the EC-MRL in mg/kg)
Acephate	8648	8601	36	0.42	11	0.13	1.44 (Peaches/Nectarines; EC-MRL: 0.02-0.2*)
Aldicarb	3422	3403	19	0.56	0	0.00	0.10 (Carrots; EC-MRL: 0.1) 0.10 (Potatoes; EC-MRL: 0.5)
Azinphos-methyl	9126	8880	242	2.65	4	0.04	1.66 (Peaches/Nectarines; EC-MRL: 0.5)
Azoxystrobin	6981	6972	8	0.11	1	0.01	1.30 (Spinach; EC-MRL: 0.05)
Benomyl group	6789	6404	376	5.54	9	0.13	4.80 (Spinach; EC-MRL: 0.1)
Bromopropylate	9233	9061	138	1.49	34	0.37	2.40 (Oranges/Mandarins; EC-MRL: 3-0.05[23])
Chlorothalonil	8994	8940	47	0.52	7	0.08	0.99 (Peaches/Nectarines; EC-MRL: 1)
Chlorpyriphos	9514	8418	1072	11.27	24	0.25	6.00 (Spinach; EC-MRL: 0.05)
Chlorpyriphos-methyl	9303	9222	81	0.87	0	0.00	0.26 (Peaches/Nectarines; EC-MRL: 0.5)
Cypermethrin	9072	8989	76	0.84	7	0.08	1.40 (Spinach; EC-MRL: 0.5)
Deltamethrin	8937	8913	23	0.26	1	0.01	0.22 (Spinach; EC-MRL: 0.5)
Diazinon	9359	9319	28	0.30	12	0.13	0.77 (Carrots; EC-MRL: 0.2)

* applicable from September 2002

[23] applicable from January 2003

Pesticide	Total No. of samples	No. of samples without residues	No. of samples with residues below or at MRL	%	No. of samples with residues above MRL	%	Maximum residue found in mg/kg (commodity in which it was found and the EC-MRL in mg/kg)
Dichlofluanid	9101	9011	90	0.99	0	0.00	4.50 (Spinach; EC-MRL: 5)
Dicofol	8980	8743	207	2.31	30	0.33	2.00 (Oranges/Mandarins; EC-MRL:2)
Dimethoate	9224	9054	160	1.73	10	0.11	3.40 (Bananas; EC-MRL: 1-0.02[24])
Endosulfan	8987	8862	104	1.16	21	0.23	1.00 (Spinach; EC-MRL:0.05)
Captan+ Folpet (Sum)	9823	9586	235	2.39	2	0.02	3.00 (Pears; EC-MRL: 3)
Imazalil	8389	6931	1438	17.14	20	0.24	8.90 (Oranges/Mandarins; EC-MRL: 5)
Iprodione	9222	8883	327	3.55	12	0.13	3.60 (Peaches/Nectarines; EC-MRL: 5)
Lambda-cyhalothrin	8662	8642	20	0.23	0	0.00	0.17 (Beans with pods EC-MRL: 0.2)
Malathion	9359	9031	328	3.50	0	0.00	1.40 (Oranges/Mandarins; EC-MRL: 2)
Maneb-group	5080	4570	450	8.85	60	1.19	25.00 (Spinach; EC-MRL: 0.05)
Mecarbam	7936	7929	3	0.04	4	0.05	0.40 (Oranges/Mandarins; EC-MRL: 0.05)
Methamidophos	8711	8647	48	0.55	16	0.18	10.80 (Beans with pods EC-MRL: 0.5)
Metalaxyl	9070	9053	12	0.13	5	0.06	0.70 (Oranges/Mandarins; EC-MRL: 0.5-0.05)
Methidathion	9152	8647	505	5.52	0	0.00	1.88 (Oranges/Mandarins; EC-MRL: 2)

[24] applicable from January 2003

Pesticide	Total No. of samples	No. of samples without residues	No. of samples with residues below or at MRL	%	No. of samples with residues above MRL	%	Maximum residue found in mg/kg (commodity in which it was found and the EC-MRL in mg/kg)
Methiocarb	5228	5210	16	0.31	2	0.04	20.00 (Beans; EC-MRL: not set)
Methomyl	3664	3631	25	0.68	8	0.22	6.10 (Spinach; EC-MRL: 2)
Omethoate	8475	8431	42	0.50	2	0.02	1.10 (Beans EC-MRL: 0.2)
Oxydemeton-methyl	4378	4376	1	0.02	1	0.02	0.54 (Spinach; EC-MRL: 0.02[25])
Parathion	9210	9184	22	0.24	4	0.04	0.29 (Peaches/Nectarines; EC-MRL: 0.2-0.05[26])
Permethrin	8556	8544	12	0.14	0	0.00	0.17 (Pears; EC-MRL: 1- 0.05*)
Phorate	7340	7337	2	0.03	1	0.01	0.07 (Carrots; EC-MRL: 0.05)
Pirimiphos-methyl	9215	9183	32	0.35	0	0.00	0.89 (Peaches/Nectarines; EC-MRL: 0.05)
Procymidone	9334	9060	268	2.87	6	0.06	1.38 (Peaches/Nectarines; EC-MRL: 2)
Propyzamide	8117	8114	1	0.01	2	0.02	0.19 (Spinach; EC-MRL: 0.02)
Thiabendazole	7788	6755	1014	13.02	19	0.24	11.00 (Oranges/Mandarins; EC-MRL: 5)
Tolylfluanid	8005	7835	170	2.12	0	0.00	0.70 (Pears; EC-MRL: not set)
Triazophos	8016	8013	0	0.00	3	0.04	0.05 (Oranges/Mandarins; EC-MRL: 0.02)
Vinclozolin	9309	9175	133	1.43	1	0.01	0.56 (Beans; EC-MRL: 2)

[25] applicable from January 2003
[26] applicable from January 2003
* applicable from 1st December 2002

Results of the 2002 co-ordinated exercise by pesticide:

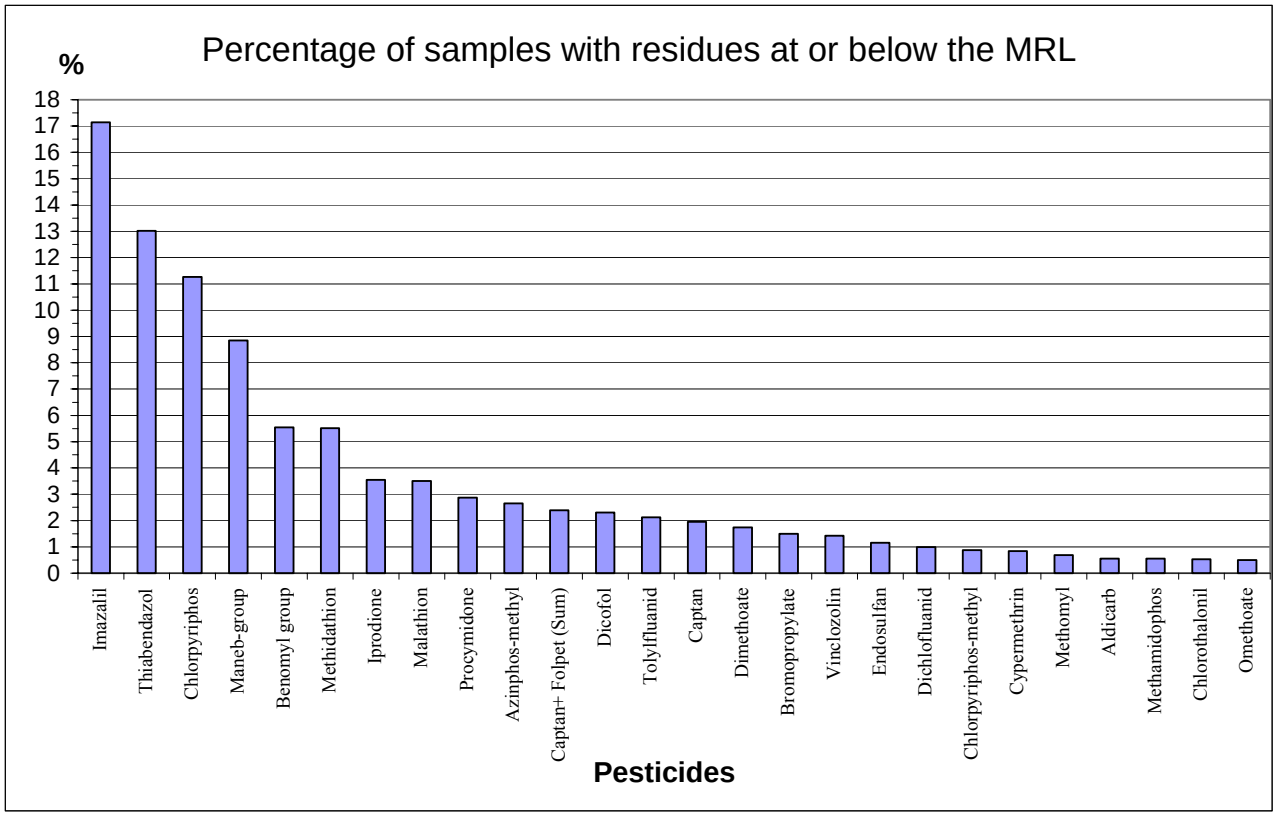

Figure 7: Samples with residues at or below MRL (national or EC-MRL)
(16 pesticides where less than 0.5% of samples had residues at or below the MRL are not included in the chart.)

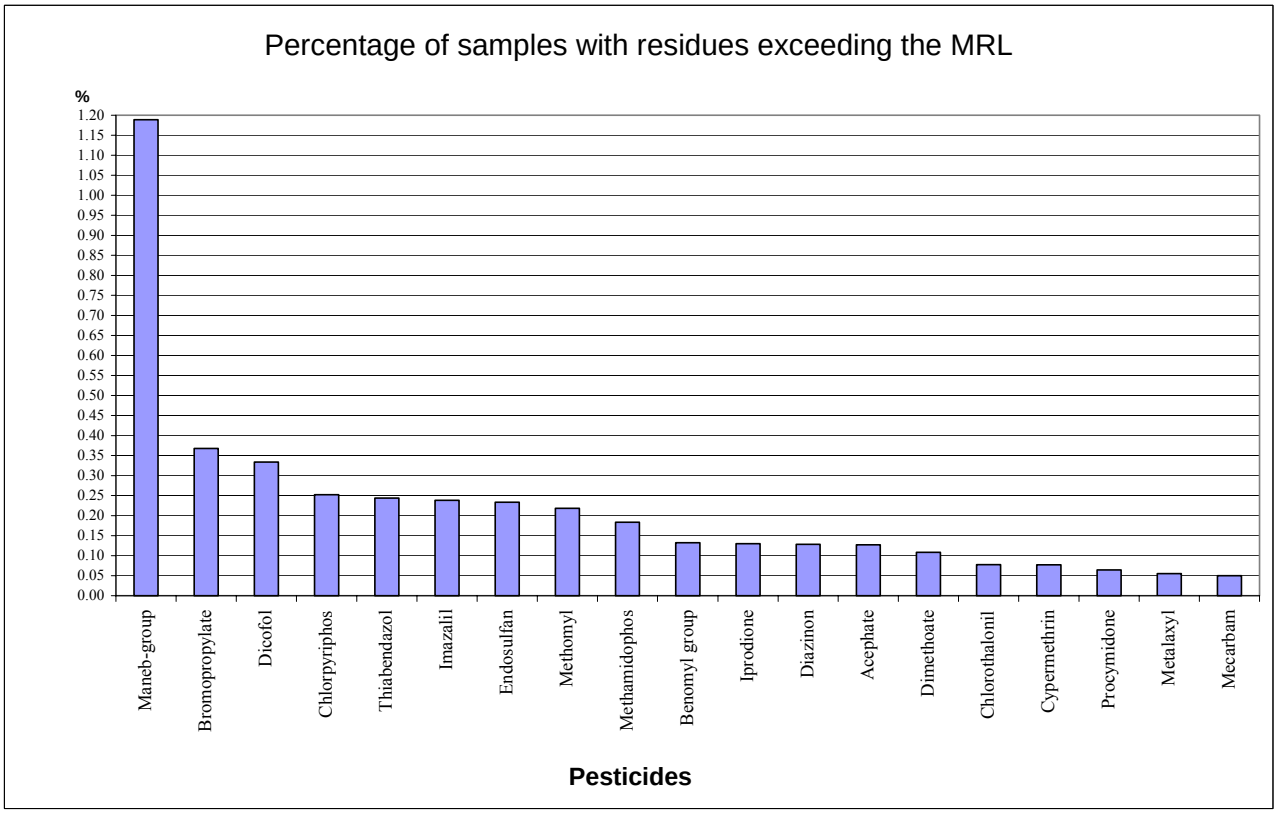

Figure 8: Samples with residues exceeding the MRL (national or EC-MRL)
(23 pesticides where less than 0.05% of samples had residues above the MRL are not included in the chart.)

Table 11: Presentation of the most important pesticide-commodity combinations where residues were found (in alphabetical order)

Pesticides	Detected most often in[27]	MRL exceeded most often in
Acephate	**Peaches /nectarines** (3.02% of all peaches /nectarines samples ; equal to 0.37% of all 8 products' samples)	**Peaches /nectarines** (0.85% of all peaches /nectarines samples ; equal to 0.10% of all 8 products' samples)
Aldicarb	**Potatoes** (2.81% of all potatoes samples; equal to 0.44% of all 8 products'samples)	No exceedances.
Azinphos-methyl	**Pears** (14.48% of all pears samples ; equal to 1.83% of all 8 products' samples) **Peaches /nectarines** (5.86% of all peaches /nectarines samples ; equal to 0.71% of all 8 products' samples)	**Pears** (0.35% of all pears samples ; equal to 0.04% of all 8 products' samples)
Azoxystrobin	**Bananas** (0.69% of all bananas samples ; equal to 0.07% of all 8 products' samples)	**Spinach** (0.21% of all spinach samples ; equal to 0.01% of all 8 products' samples)
Benomyl group	**Pears** (13.16% of all pears samples ; equal to 1.80% of all 8 products' samples) **Peaches /nectarines** (11.60% of all peaches /nectarines samples ; equal to 1.40% of all 8 products' samples **Oranges/mandarins** (9.60% of all oranges /mandarins samples ; equal to 1.99% of all 8 products' samples)	**Beans** (0.81% of all beans samples ; equal to 0.09% of all 8 products' samples)
Bromopropylate	**Pears** (5.44% of all pears samples ; equal to 0.73% of all 8 products' samples) **Oranges/mandarins** (4.73% of all oranges /mandarins samples ; equal to 0.99% of all 8 products' samples)	**Oranges/mandarins** (1.61% of all oranges /mandarins samples ; equal to 0.34% of all 8 products' samples)

[27] Percentages in this column include samples at or below the MRL and exceeding the MRL

Pesticides	Detected most often in[27]	MRL exceeded most often in
Chlorothalonil	**Pears** (1.81% of all pears samples ; equal to 0.24% of all 8 products' samples) **Peaches /nectarines** (1.23% of all peaches /nectarines samples ; equal to 0.14% of all 8 products' samples) **Beans** (1.14% of all beans samples; equal to 0.10% of all 8 products' samples.	**Beans** (0.51% of all beans samples; equal to 0.04% of all 8 products' samples.
Chlorpyriphos	**Oranges/mandarins** (38.94% of all oranges /mandarins samples ; equal to 7.91% of all 8 products' samples) **Peaches /nectarines** (9.87% of all peaches /nectarines samples ; equal to 1.16% of all 8 products' samples) **Pears** (9.11% of all pears samples ; equal to 1.21% of all 8 products' samples) **Bananas** (8.13% of all bananas samples ; equal to 0.75% of all 8 products' samples)	**Beans** (0.84% of all beans samples; equal to 0.07% of all 8 products' samples. **Oranges/mandarins** (0.36% of all oranges /mandarins samples ; equal to 0.07% of all 8 products' samples)
Chlorpyriphos-methyl	**Pears** (3.26% of all pears samples ; equal to 0.44% of all 8 products' samples) **Peaches /nectarines** (1.81% of all peaches /nectarines samples ; equal to 0.21% of all 8 products' samples)	No exceedances.
Cypermethrin	**Spinach** (5.55% of all spinach samples ; equal to 0.35% of all 8 products' samples) **Beans** (3.65% of all beans samples ; equal to 0.33% of all 8 products' samples)	**Beans** (0.61% of all beans samples ; equal to 0.06% of all 8 products' samples) **Spinach** (0.35% of all spinach samples ; equal to 0.02% of all 8 products' samples)
Deltamethrin	**Spinach** (1.75% of all spinach samples ; equal to 0.11% of all 8 products' samples)	**Peaches /nectarines** (0.10% of all peaches /nectarines samples ; equal to 0.01% of all 8 products' samples)

Pesticides	Detected most often in[27]	MRL exceeded most often in
Diazinon	**Carrots** (1.13% of all carrots samples ; equal to 0.17% of all 8 products' samples)	**Oranges/mandarins** (0.30% of all oranges /mandarins samples ; equal to 0.06% of all 8 products' samples)
Dichlofluanid	**Pears** (6.77% of all pears samples ; equal to 0.91% of all 8 products' samples)	No exceedances.
Dicofol	**Oranges/mandarins** (10.53% of all oranges /mandarins samples ; equal to 2.20% of all 8 products' samples)	**Pears** (0.84% of all pears samples ; equal to 0.11% of all 8 products' samples)
Dimethoate	**Beans** (4.33% of all beans samples ; equal to 0.39% of all 8 products' samples) **Oranges/mandarins** (4.05% of all oranges /mandarins samples ; equal to 0.86% of all 8 products' samples)	**Oranges/mandarins** (0.21% of all oranges /mandarins samples ; equal to 0.04% of all 8 products' samples)
Endosulfan	**Beans** (3.76% of all beans samples ; equal to 0.34% of all 8 products' samples) **Pears** (2.40% of all pears samples ; equal to 0.32% of all 8 products' samples)	**Beans** (1.58% of all beans samples ; equal to 0.14% of all 8 products' samples) **Spinach** (0.70% of all spinach samples ; equal to 0.04% of all 8 products' samples)
Captan+ Folpet (Sum)	**Pears** (13.54% of all pears samples ; equal to 1.90% of all 8 products' samples) **Peaches /nectarines** (2.96% of all peaches /nectarines samples ; equal to 0.38% of all 8 products' samples)	**Spinach** (0.17% of all spinach samples ; equal to 0.01% of all 8 products' samples)
Imazalil	**Oranges/mandarins** (60.44% of all oranges /mandarins samples ; equal to 13.62% of all 8 products' samples) **Bananas** (32.22% of all bananas samples ; equal to 3.11% of all 8 products' samples)	**Oranges/mandarins** (0.90% of all oranges /mandarins samples ; equal to 0.20% of all 8 products' samples)

Pesticides	Detected most often in[27]	MRL exceeded most often in
Iprodione	**Peaches /nectarines** (12.79% of all peaches /nectarines samples ; equal to 1.52% of all 8 products' samples) **Carrots** (9.50% of all carrots samples ; equal to 1.43% of all 8 products' samples)	**Spinach** (1.37% of all spinach samples ; equal to 0.09% of all 8 products' samples) **Peaches /nectarines** (0.27% of all peaches /nectarines samples ; equal to 0.03% of all 8 products' samples)
Lambda-cyhalothrin	**Pears** (1.12% of all pears samples ; equal to 0.15% of all 8 products' samples)	No exceedances.
Malathion	**Oranges/mandarins** (15.40% of all oranges /mandarins samples ; equal to 3.26% of all 8 products' samples)	No exceedances.
Maneb-group	**Pears** (28.09% of all pears samples ; equal to 4.39% of all 8 products' samples) **Spinach** (14.36% of all spinach samples ; equal to 1.14% of all 8 products' samples) **Oranges/mandarins** (9.30% of all oranges /mandarins samples ; equal to 1.67% of all 8 products' samples) **Peaches /nectarines** (8.81% of all peaches /nectarines samples ; equal to 1.10% of all 8 products' samples)	**Spinach** (11.88% of all spinach samples ; equal to 0.94% of all 8 products' samples) **Beans** (1.29% of all beans samples ; equal to 0.14% of all 8 products' samples)
Mecarbam	**Oranges/mandarins** (0.33% of all oranges /mandarins samples ; equal to 0.08% of all 8 products' samples)	**Oranges/mandarins** (0.22% of all oranges /mandarins samples ; equal to 0.05% of all 8 products' samples)
Methamidophos	**Peaches /nectarines** (3.68% of all peaches /nectarines samples ; equal to 0.46% of all 8 products' samples) **Beans** (2.55% of all beans samples ; equal to 0.23% of all 8 products' samples)	**Beans** (1.02% of all beans samples ; equal to 0.09% of all 8 products' samples) **Peaches /nectarines** (0.64% of all peaches /nectarines samples ; equal to 0.08% of all 8 products' samples)

Pesticides	Detected most often in[27]	MRL exceeded most often in
Metalaxyl	**Beans** (0.50% of all beans samples ; equal to 0.04% of all 8 products' samples)	**Oranges/mandarins** (0.21% of all oranges /mandarins samples ; equal to 0.04% of all 8 products' samples)
Methidathion	**Oranges/mandarins** (25.52% of all oranges /mandarins samples ; equal to 5.46% of all 8 products' samples)	No exceedances.
Methiocarb	**Potatoes** (1.91% of all potato samples ; equal to 0.25% of all 8 products' samples)	**Beans** (0.17% of all beans samples ; equal to 0.02% of all 8 products' samples)
Methomyl	**Spinach** (3.23% of all spinach samples ; equal to 0.30% of all 8 products' samples) **Potatoes** (3.10% of all potato samples ; equal to 0.35% of all 8 products' samples) **Peaches /nectarines** (1.18% of all peaches /nectarines samples ; equal to 0.14% of all 8 products' samples)	**Peaches /nectarines** (0.94% of all peaches /nectarines samples ; equal to 0.11% of all 8 products' samples) **Spinach** (0.88% of all spinach samples ; equal to 0.08% of all 8 products' samples)
Omethoate	**Beans** (1.67% of all beans samples ; equal to 0.15% of all 8 products' samples)	**Beans** (0.13% of all beans samples ; equal to 0.01% of all 8 products' samples)
Oxydemeton-methyl	**Spinach** (0.29% of all spinach samples ; equal to 0.02% of all 8 products' samples)	**Spinach** (0.29% of all spinach samples ; equal to 0.02% of all 8 products' samples)
Parathion	**Oranges/mandarins** (0.67% of all oranges /mandarins samples ; equal to 0.14% of all 8 products' samples) **Peaches /nectarines** (0.36% of all peaches /nectarines samples ; equal to 0.04% of all 8 products' samples)	**Oranges/mandarins** (0.10% of all oranges /mandarins samples ; equal to 0.02% of all 8 products' samples) **Peaches /nectarines** (0.09% of all peaches /nectarines samples ; equal to 0.01% of all 8 products' samples)
Permethrin	**Pears** (0.55% of all pears samples ; equal to 0.07% of all 8 products' samples)	No exceedances.

Pesticides	Detected most often in[27]	MRL exceeded most often in
Phorate	**Carrots** (0.28% of all carrots samples ; equal to 0.04% of all 8 products' samples)	**Carrots** (0.09% of all carrots samples ; equal to 0.01% of all 8 products' samples)
Pirimiphos-methyl	**Oranges/mandarins** (1.45% of all oranges /mandarins samples ; equal to 0.30% of all 8 products' samples)	No exceedances.
Procymidone	**Pears** (13.42% of all pears samples ; equal to 1.81% of all 8 products' samples) **Peaches /nectarines** (5.17% of all peaches /nectarines samples ; equal to 0.61% of all 8 products' samples) **Beans** (3.86% of all beans samples ; equal to 0.34% of all 8 products' samples)	**Spinach** (0.17% of all spinach samples ; equal to 0.01% of all 8 products' samples) **Carrots** (0.14% of all carrots samples ; equal to 0.02% of all 8 products' samples)
Propyzamide	**Spinach** (0.52% of all spinach samples ; equal to 0.04% of all 8 products' samples)	**Spinach** (0.34% of all spinach samples ; equal to 0.02% of all 8 products' samples)
Thiabendazole	**Oranges/mandarins** (36.55% of all oranges /mandarins samples ; equal to 8.32% of all 8 products' samples) **Bananas** (35.68% of all bananas samples ; equal to 3.58% of all 8 products' samples) **Pears** (7.62% of all pears samples ; equal to 0.96% of all 8 products' samples)	**Oranges/mandarins** (0.62% of all oranges /mandarins samples ; equal to 0.14% of all 8 products' samples) **Peaches /nectarines** (0.57% of all peaches /nectarines samples ; equal to 0.06% of all 8 products' samples) **Carrots** (0.20% of all carrots samples ; equal to 0.03% of all 8 products' samples)
Tolylfluanid	**Pears** (16.73% of all pears samples ; equal to 2.10% of all 8 products' samples)	No exceedances.

Pesticides	Detected most often in[27]	MRL exceeded most often in
Triazophos	**Beans** (0.13% of all beans samples ; equal to 0.01% of all 8 products' samples)	**Beans** (0.13% of all beans samples ; equal to 0.01% of all 8 products' samples)
Vinclozolin	**Beans** (11.08% of all beans samples ; equal to 0.99% of all 8 products' samples) **Carrots** (1.82% of all carrots samples ; equal to 0.28% of all 8 products' samples)	**Spinach** (0.17% of all spinach samples ; equal to 0.01% of all 8 products' samples)

The most important pesticide-commodity combination where detectable residues were found (including those at or below the MRL and exceeding the MRL) was imazalil/orange-mandarins where 60.44% of samples had residues. This is followed by chlorpyriphos in orange/mandarins at 38.94%, thiabendazole/orange-mandarins at 36.55%, thiabendazole/bananas at 35.68%, imazalil/bananas at 32.22%, maneb group/pears at 28.09% and methidathion/oranges-mandarins at 25.52%.

With regard to MRL exceedances, the most important pesticide-commodity combinations were maneb group/spinach (11.88 %) and bromopropylate/oranges (1.61%).

Table 12: Comparative overview of the group of pesticides that were analysed in 1997 or 1998 for the same commodities examined in 2002

	% of samples with residues AT OR BELOW the MRL															
	Pears		Bananas		Beans		Potatoes		Carrots		Oranges*		Peaches#		Spinach	
	'97	'02	'97	'02	'97	'02	'97	'02	'98	'02	'98	'02	'98	'02	'98	'02
Acephate	0.37	0.37	0.00	0.00	0.32	0.38	0.00	0.08	0.16	0.00	0.00	0.22	0.86	2.17	0.00	0.18
Benomyl group	13.29	13.16	0.79	0.98	1.74	2.16	0.50	0.00	0.23	0.14	4.25	9.60	9.05	11.36	0.21	0.43
Chlorothalonil	0.08	1.81	0.00	0.00	0.68	0.63	0.00	0.00	x	x	x	x	x	x	x	x
Chlorpyriphos	2.00	9.11	9.36	8.13	0.29	0.60	0.30	0.00	0.95	1.62	19.67	38.18	3.61	9.78	0.47	0.51
Chlorpyriphos-methyl	x	x	x	x	x	x	x	x	0.00	0.07	1.61	0.93	1.50	1.81	0.00	0.00
Deltamethrin	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.00	0.10	0.39	1.94	1.75
Diazinon	0.87	0.48	0.00	0.00	0.14	0.00	0.06	0.08	1.65	0.85	1.42	0.30	0.65	0.27	0.00	0.00
Endosulfan	1.94	2.40	0.33	0.00	3.51	2.18	0.12	0.08	0.64	0.29	1.54	1.50	4.33	2.00	1.79	0.53
Imazalil	x	x	x	x	x	x	x	x	0.00	0.00	57.34	59.55	0.00	0.30	0.00	0.00
Iprodione	3.49	3.52	0.00	0.00	2.19	1.09	0.06	0.00	8.73	9.43	0.00	0.31	6.74	12.51	0.24	0.00
Lambda-cyhalothrin	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.06	1.47	0.10	1.47	0.56
Maneb-group	x	x	x	x	x	x	x	x	1.47	1.03	4.23	9.30	12.11	8.81	3.47	2.48
Mecarbam	x	x	x	x	x	x	x	x	0.00	0.08	1.20	0.11	0.00	0.00	0.00	0.00
Metalaxyl	0.00	0.09	0.00	0.12	0.00	0.38	0.00	0.07	0.00	0.08	4.58	0.21	0.00	0.10	0.12	0.00
Methamidophos	0.09	0.09	0.00	0.00	2.20	1.53	0.00	0.08	0.00	0.00	0.07	0.00	2.14	3.04	0.12	0.18
Methidathion	0.31	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.71	25.52	0.28	0.09	0.00	0.00
Permethrin	x	x	x	x	x	x	x	x	0.00	0.08	0.07	0.00	0.00	0.00	3.07	0.18
Pirimiphos-methyl	x	x	x	x	x	x	x	x	0.07	0.00	2.84	1.45	0.00	0.27	0.00	0.00
Thiabendazol	6.73	7.62	45.59	35.68	0.17	0.00	1.25	1.48	0.33	0.00	30.10	35.93	0.49	0.57	0.34	0.19
Triazophos	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.12	0.00	0.00	0.00
Vinclozolin	x	x	x	x	x	x	x	x	1.23	1.82	0.00	0.10	1.83	0.64	0.23	0.35

x indicates that comparison is not possible. * Oranges and mandarins, in 2002. # Peaches and nectarines, in 2002.

	% of samples with residues ABOVE the MRL															
	Pears		Bananas		Beans		Potatoes		Carrots		Oranges*		Peaches#		Spinach	
	'97	'02	'97	'02	'97	'02	'97	'02	'98	'02	'98	'02	'98	'02	'98	'02
Acephate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.97	0.85	0.00	0.18
Benomyl group	0.00	0.00	0.00	0.00	0.22	0.81	0.00	0.00	0.00	0.00	0.00	0.00	1.43	0.24	0.42	0.21
Chlorothalonil	0.00	0.00	0.10	0.00	0.27	0.51	0.06	0.08	x	x	x	x	x	x	x	x
Chlorpyriphos	0.00	0.00	0.26	0.00	0.14	0.84	0.00	0.07	0.37	0.35	0.27	0.36	0.28	0.09	0.24	0.51
Chlorpyriphos-methyl	x	x	x	x	x	x	x	x	0.00	0.00	0.14	0.00	0.09	0.00	0.00	0.00
Deltamethrin	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
Diazinon	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.35	0.28	0.00	0.30	0.00	0.00	0.00	0.00
Endosulfan	0.00	0.00	0.00	0.00	0.00	1.58	0.00	0.00	0.08	0.29	0.00	0.00	0.00	0.00	0.00	0.70
Imazalil	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.90	0.00	0.10	0.00	0.19
Iprodione	0.00	0.00	0.00	0.00	0.29	0.00	0.32	0.00	0.08	0.07	0.14	0.00	0.00	0.27	1.32	1.37
Lambda-cyhalothrin	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maneb-group	x	x	x	x	x	x	x	x	3.48	0.00	0.00	0.00	0.43	0.00	4.29	11.88
Mecarbam	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00
Metalaxyl	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.12	0.00
Methamidophos	0.00	0.00	0.00	0.00	1.52	1.02	0.00	0.00	0.00	0.00	0.00	0.00	1.63	0.64	0.00	0.18
Methidathion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Permethrin	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.00
Pirimiphos-methyl	x	x	x	x	x	x	x	x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Thiabendazol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.20	0.30	0.62	0.12	0.57	0.17	0.00
Triazophos	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.08	0.00	0.06	0.12	0.00	0.00	0.00
Vinclozolin	x	x	x	x	x	x	x	x	1.24	0.00	0.07	0.00	0.00	0.00	0.23	0.17

x indicates that comparison is not possible. * Oranges and mandarins, in 2002. # Peaches and nectarines, in 2002.

The commodities examined in 2002 had already been evaluated in 1997 and 1998. Table 12 shows a comparative overview for the pesticides that were also analysed in those years.

For the group of commodities examined in 1997, results of 12 pesticides can be compared, while in the case of commodities examined in 1998 the results of 20 pesticides can be compared.

For almost all of the pesticides the frequency of samples with residues at or below the MRL remains at comparable levels, with some notable exceptions. The exceptions concern benomyl group, chlorpyriphos and maneb-group in oranges whose frequencies of detections doubled in 2002. A high increase is reported also in thiabendazole and methidathion in oranges, while a significant decrease is reported in metalaxyl in oranges and thiabendazole in bananas.

A high increase in the frequency of samples with residues at or below the MRL is reported for iprodione and chlorpyriphos in peaches and carrots, while on the other hand there is a notable decrease in endosulfan and maneb-group.

In some cases, the low level of frequency remains comparable or there is a decrease in detections in almost all the commodities examined for diazinon, endosulfan (except for pears), mecarbam, metalaxyl, permethrin, and triazophos.

It is evident that the commodity in which the frequency of residues has greatly increased is orange/mandarins, followed by peaches and pears with a certain decrease in the case of maneb group and endosulfan in peaches.

The percentages of exceedances are still all below the 2%, except for maneb-group, that, as in the past, has the highest percentages and shows a high increase in spinach but a relevant decrease in carrots.

It should be borne in mind that comparison is difficult due to the fact that MRLs have changed from 1997 to 2002. For example, in the case of oranges, for the 41 pesticides examined, 16 MRLs have changed since 1997 and 7 of these are now set at the limit of determination.

5.3. Evaluation by commodity

Tables 13 and 14 give an overview of the findings in the different commodities. With regard to all eight commodities investigated, about 53 % of the samples were without detectable residues, 44 % of the samples contained residues of pesticides at or below the MRL (national or EC-MRL), and 3.3 % above the MRL (Table 13). Residues at or below the MRL were found most often in oranges/mandarins (78 %), followed by pears (67 %), bananas (56 %) and peaches/nectarines (45%). MRLs (including national or EC-MRLs) were exceeded most often in spinach (13 %), followed by beans (7 %), oranges/mandarins (4 %), and peaches/nectarines (3 %).

In these results, no differentiation is made with regard to findings of several pesticides in the same sample. This means that a sample where two different pesticides were found would be counted as just one finding with detectable residues in Table 13.

Supplementary to that, Table 14 shows the residues found in individual determinations, which means the findings with regard to every single pesticide. In this table, a sample where two

different pesticides were found would be counted as two findings with detectable residues. In this evaluation, residues of a specific pesticide at or below the MRL (national or EC-MRL) were found most often in oranges/mandarins (5.6 %), followed by pears (4 %), bananas (2 %) and peaches/nectarines (1.9 %). This is consistent with the results in Table 13.

The highest frequencies of exceedances were found in spinach (13 %), followed by beans (7 %), oranges/mandarins (4 %) and peaches/nectarines (3 %).

In the case of pesticide residues exceedances with respect to the number of determinations, the highest frequency was in spinach (0.37 %), followed by beans (0.21 %), oranges/mandarins (0.12 %) and peaches/nectarines (10 %). This is consistent with the results in Table 13.

It can be concluded that oranges/mandarins and pears were the commodities on which pesticide residues were most often detected, while spinach and beans were the commodities where MRLs (national or EC-MRLs) were most often exceeded.

Table 13: Residues found in the eight commodities analysed in the EU co-ordinated monitoring programme

	Number of samples analysed	**Without detectable residues**	**%**	**With residues below or at MRL (national or EC-MRL)**	**%**	**With residues above MRL (national or EC-MRL)**	**%**
Pears	1330	415	31	894	67	21	2
Bananas	883	380	43	491	56	12	1
Beans	896	562	63	272	30	62	7
Potatoes	1502	1338	89	156	10	8	1
Carrots	1457	1128	77	308	21	21	1
Oranges/ Mandarins	2144	384	18	1674	78	86	4
Peaches/ Nectarines	1190	612	51	541	45	37	3
Spinach	644	486	75	77	12	81	13
SUM	10046	5305	53	4413	44	328	3.3

Table 14: Residues found in individual determinations in the eight commodities analysed in the EU co-ordinated monitoring programme

	Total number of ind. det.	Number of ind. det. without residues	Number of ind. det. with residues below or at MRL (national or EC)	%	Number of ind. det. where a residue exceeded the MRL (national or EC)	%
Pears	45100	43297	1782	4.0	21	0.05
Bananas	32514	31847	655	2.0	12	0.04
Beans	31777	31376	334	1.1	67	0.21
Potatoes	48802	48700	94	0.2	8	0.02
Carrots	51097	50827	249	0.5	21	0.04
Oranges/ Mandarins	72457	68339	4029	5.6	89	0.12
Peaches/ Nectarines	39957	39148	770	1.9	39	0.10
Spinach	22342	22171	88	0.4	83	0.37
SUM	344046	335705	8001	2.3	340	0.10

It appears from table 15 that, on all eight commodities as a whole, pesticides have had a frequency of detection similar to 2001 and higher than the average of previous years. However, data are not directly comparable given that commodities and pesticides evaluated were different in the various years (see also chapter 5.2.)

Table 15: Overall results of the 4 - 8 commodities analysed during 1997 - 2002

Commodities analysed in year	Number of samples analysed	Without detectable residues	%	With residues below or at MRL (national or EC-MRL)	%	With residues above MRL (national or EC-MRL)	%
1996	n/a	n/a		n/a		n/a	
1997	6021	3932	65	2023	34	66	1.1
1998	3836	2524	66	1235	32	77	2.0
1999	4707	3227	69	1043	22	411	8.7
2000	3737	2998	80	638	17	101	2.7
2001	9868	4985	51	4668	47	215	2.2
2002	10046	5305	53	4413	44	328	3.3

n/a: not available

5.4. Evaluation by country

With regard to the 41 pesticides and the eight commodities of the co-ordinated programme, residues at or below the MRL (national or EC-MRL) were found in 44 % of the samples. In 3.3 % of the samples these residues exceeded MRLs (national or EC-MRLs). Differences between countries can result e.g. from different sampling approaches (degree of surveillance sampling and follow-up enforcement sampling), amounts of samples analysed for pesticides that are most likely to be found, legislative framework and reporting levels (cf. chapter 4.1). Table 16 shows the results sorted by country and Figure 9 illustrates those results.

Table 16: Residues of pesticides in the eight commodities as analysed in the EU Co-ordinated programme

	Number of samples analysed	Without detectable residues	%	With residues below or at MRL (national or EC-MRL)	%	With residues above MRL (national or EC-MRL)	%
B	296	182	61	109	37	5	1.7
DK	500	268	54	223	45	9	1.8
D	1885	908	48	897	48	80	4.2
EL	240	133	55	94	39	13	5.4
E	366	233	64	114	31	19	5.2
F	1204	643	53	535	44	26	2.2
IRL	227	97	43	124	55	6	2.6
I	1322	805	61	508	38	9	0.7
L	100	78	78	19	19	3	3.0
NL	649	237	37	371	57	41	6.3
A	99	35	35	59	60	5	5.1
P	502	392	78	98	20	12	2.4
FIN	410	118	29	244	60	48	11.7
S	622	340	55	264	42	18	2.9
UK	1022	531	52	473	46	18	1.8
Norway	483	248	51	224	46	11	2.3
Iceland	92	31	34	57	62	4	4.3
Liechtenstein	27	26	96	0	0	1	3.7
Total	10046	5305	53	4413	44	328	3.3

Evaluation of the results of the 2002 co-ordinated exercise by country:
Percentage of samples without detectable residues, with residues at or below MRL (national or EC-MRL) and with residues exceeding the MRL (national or EC-MRL)

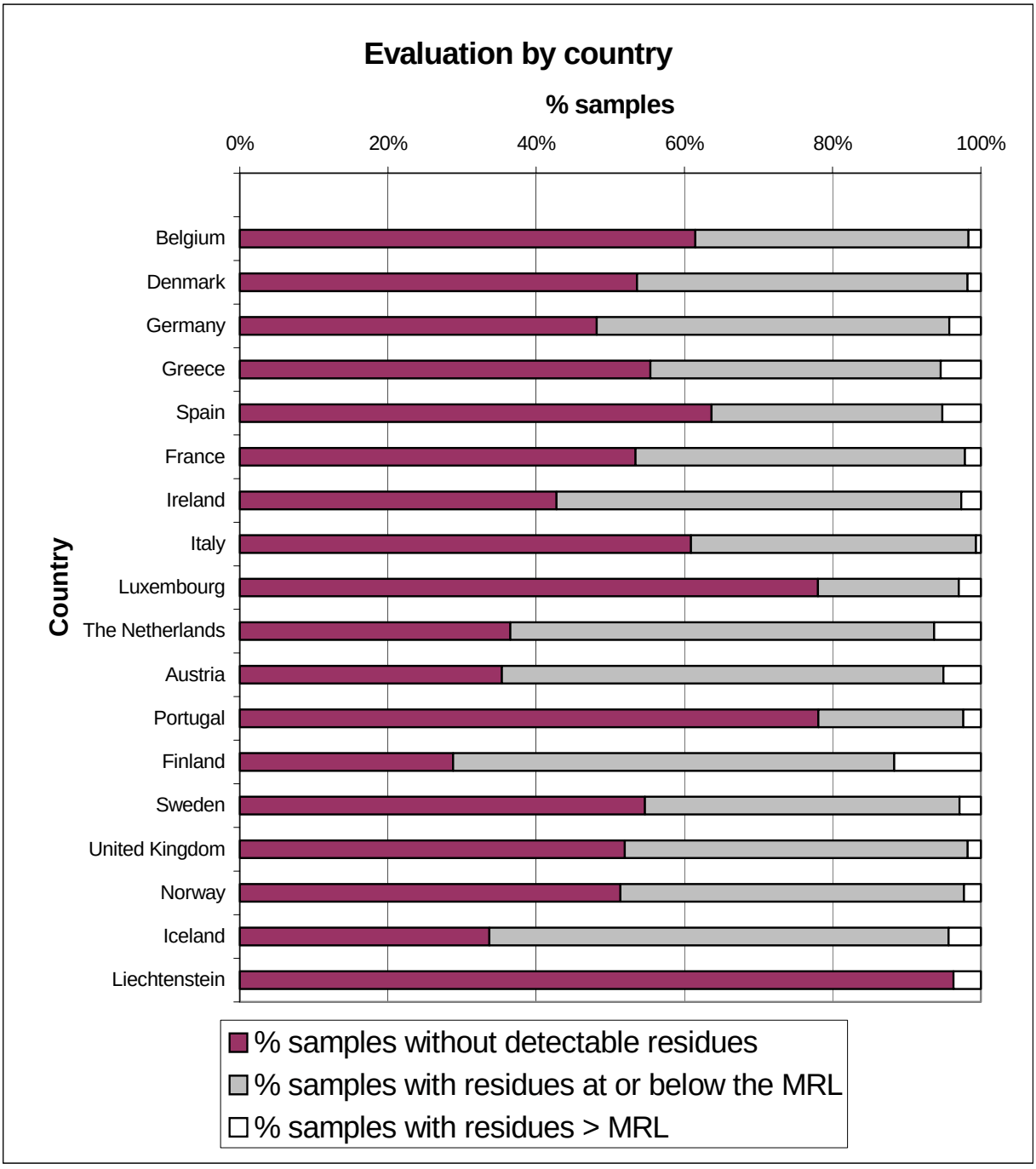

Figure 9: Percentage of samples without residues, with residues at or below the MRL and with residues exceeding the MRL sorted by country

5.5. Homogeneity exercise

In 2002, for the third time since 1996, a special exercise was carried out to determine the distribution of pesticide residues in the individual sample units taken from commercial trade, which form part of the analytical sample (composite sample). The residue contents in the individual sample units can differ. This may be partly due to the fact that they do or do not originate from the same producer and therefore may or may not have had the same sample treatment history. But differences can also occur in sample units from the same producer as Tables 17 and 18 show. In order to get an idea of the variability of the single units (and therefore of the homogeneity of the composite monitoring sample) the participating countries were requested to carry out this exercise for a pesticide possibly posing an acute risk.

In 2002, at least one of the following combinations was recommended: aldicarb on potatoes or bananas, oxydemeton-methyl in spinach, chlorpropham in potatoes and phosmet in pears. It was recommended to take two samples of an appropriate number of items, analyse the first sample as a composite sample after mixing the items and, if there were detectable residues in the composite sample, to analyse the single items of the second sample. The participating countries were also asked to give information on whether the single units of a sample were taken from a single producer.

The homogeneity of the composite monitoring sample is expressed by calculating a factor, which is called the "homogeneity factor" in order to clearly distinguish this factor from the variability factor (υ) obtained from supervised field trials. The homogeneity factor indicates the variability of the single items' results of a composite monitoring sample, taken in commercial trade. It is calculated by dividing the maximum value by the mean value of the single items' results.

Eight out of eighteen countries delivered data for the homogeneity exercise in 2002, but only 5 countries delivered data for two of the combinations recommended (chlorpropham in potatoes and phosmet in pears). These 5 sets of data were used to calculate mean homogeneity factors, while the other data reported for various combinations not comparable with each other are shown in Table 19.

Three countries analysed the combination chlorpropham/potatoes. Between one and three composite samples were taken and, within each sample, 7 - 10 single items were analysed. Table 17 shows the results obtained.

Two countries analysed the combination phosmet/pears. Between three and four composite samples were taken and, within each sample, 6- 10 single items were analysed. Table 18 shows the results obtained.

The distribution of the homogeneity factors obtained in the composite samples analysed unit-to-unit in the participating countries is illustrated in Figures 10 and 11.

Table 17: Results of the homogeneity exercise for chlorpropham in potatoes in three countries

Country	Number of compo-site samples analysed	Number of single units analysed in each composite sample	Homo-geneity factor of each composite sample	Average homogeneity factor	Mini-mum homogeneity factor	Maxi-mum homogeneity factor	Max. residue found in a single unit (mg/kg)	Samples taken from single pro-ducer
B	3	7-10	1) 1.21 2) 3.37 3) 1.66	2.08	1.21	3.37	25	Yes
LU	1	10	2.32*	n.a.	n.a.	n.a.	0.02	Yes
Norway	2	10	1) 1.83 2) 1.82	1.82	1.82	1.83	2.9	Yes
All 3 count-ries	Range: 1-3 Sum: 6	Range: 7-10	2.04 (Average over 6 values from 3 countries)		1.21	3.37	25	Yes

*Homogeneity factor of the one sample analysed
n.a. not applicable since only one composite sample was analysed

Table 18: Results of the homogeneity exercise for phosmet in pears in two countries

Country	Number of compo-site samples analysed	Number of single units analysed in each composite sample	Homo-geneity factor of each composite sample	Average homogeneity factor	Minimum homogeneity factor	Maximum homogeneity factor	Max. residue found in a single unit (mg/kg)	Samples taken from single producer
EL	3	6-10	1) 1.50 2) 2.21 3) 2.77	2.16	1.50	2.78	0.2	Yes
AU	4	10	1) 1.85 2) 1.88 3) 3.99 4) 1.36	2.27	1.36	3.99	0.36	Yes
All 2 count-ries	Range: 3-4 Sum: 7	Range: 6-10	2.22 (Average over 7 values from 2 countries)	--	1.36	3.99	0.36	Yes

Table 19: Results of the homogeneity exercise for various commodity/pesticides combinations

Coun-try	Commodity/ pesticide analysed	Number of compo-site samples analysed	Number of single units analysed in each composite sample	Homogen-eity factor of each composite sample	Average homogen-eity factor	Mini-mum homogen-eity factor	Maxi-mum homogen-eity factor	Max. residue found in a single unit (mg/kg)	Samples taken from single producer
IRL	Peaches/ metamidophos	1	10	2.32*	n.a.	n.a.	n.a.	0.088	Unknow n
NL	Oranges/ imazalil	6	20	1) 1.68 2) 2.29 3) 1.87 4) 1.53 5) 1.41 6) 1.43	1.7	1.41	2.29	13	No
NL	Orange/ azoxystrobin	1	20	1.83*	n.a.	n.a.	n.a.	0.12	No
NL	Orange/ chlorpyriphos	2	20	1) 2.98 2) 3.46	3.2	2.98	3.46	0.26	No
NL	Orange/ dicofol	1	20	4.42*	n.a.	n.a.	n.a.	0.98	No
NL	Orange/ ethion	1	20	5.67*	n.a.	n.a.	n.a.	1.10	No
NL	Orange/ thiabendazole	2	20	1) 2.25 2) 1.78	2	1.78	2.25	4.4	No
NL	Orange/ methidathion	3	20	1)7.92 2)5.44 3)4.24	5.9	4.24	7.92	0.41	No
NL	Orange/ ortho-phenylphenol	1	20	1.88*	n.a.	n.a.	n.a.	4.4	No
S	Table grapes/ chlorpyrifos	2	6	1) 1.41 2) 1.44	1.42	1.41	1.44	0.63	unknown
S	Nectarines/ acephate	1	10	1.82*	n.a.	n.a.	n.a.	1.93	unknown
S	Egg plants/ Monocrotophos	1	9	3.12*	n.a.	n.a.	n.a.	0.45	unknown
S	Nectarines/ metamidophos	1	10	1.91*	n.a.	n.a.	n.a.	0.38	unknown

*Homogeneity factor of the one sample analysed
n.a. not applicable since only one composite sample was analysed

Homogeneity exercise for chlorpropham in potatoes in three countries:

Homogeneity factors calculated for 6 composite samples, analysed unit-to-unit in three participating countries.

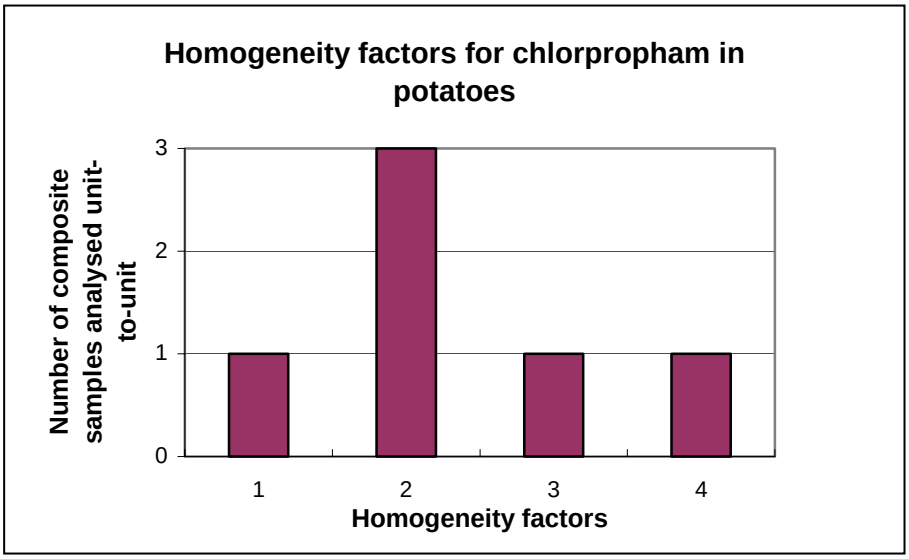

Figure 10: Homogeneity factors for chlorpropham in potatoes results of 6 composite samples analysed unit-to-unit in 3 countries[28]

As demonstrated in Table 17, the average factor for the homogeneity of the sample obtained by the three countries, which delivered single unit data, was 2.04. The minimum homogeneity factor was 1.21 and the maximum homogeneity factor was 3.37. The highest residue found in a composite sample was 8.55 mg/kg. The highest residue found in a single unit was 25 mg/kg.

[28] Column 1 (homogeneity factor 1) includes all homogeneity factors from 0.5 up to 1.4.
Column 2 (homogeneity factor 2) includes homogeneity factors from 1.5 up to 2.4, respectively. The same scheme applies for columns 3 and 4.

2002 Homogeneity exercise for phosmet in pears in two countries:

Homogeneity factors calculated for 7 composite samples, analysed unit-to-unit in two participating countries.

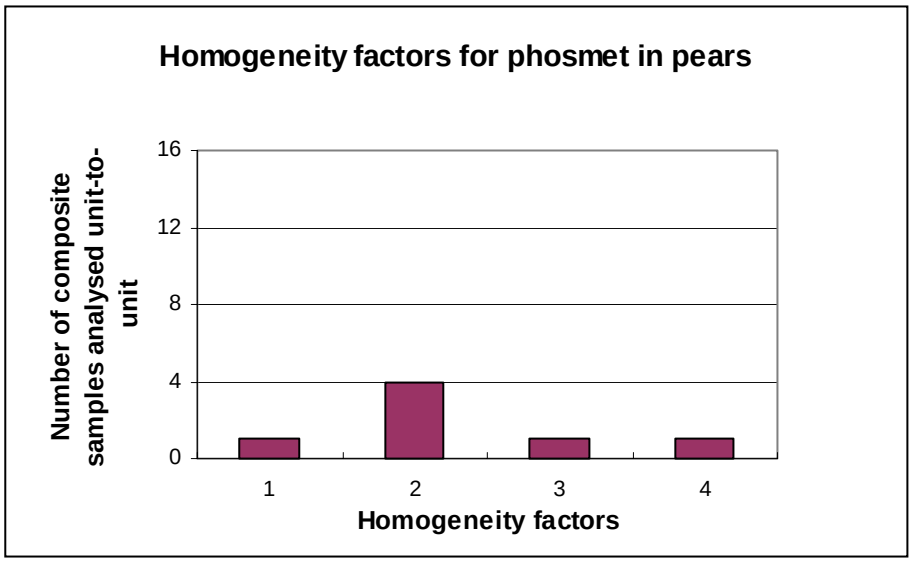

Figure 11: Homogeneity factors for phosmet in pears, results of 7 composite samples analysed unit-to-unit in 2 countries[29]

As demonstrated in Table 18, the average factor for the homogeneity of the sample obtained by the four countries, which delivered single unit data, was 2.22. The minimum homogeneity factor was 1.36 and the maximum homogeneity factor was 3.99. The highest residue found in a composite sample was 0.14 mg/kg. The highest residue found in a single unit was 0.36 mg/kg.

[29] The grouping of the homogeneity factors to the columns has been done as explained in footnote 23 (Figure 10)

5.6. Exposure assessment

5.6.1. Chronic risk

To estimate the chronic risk to the consumer for the commodities investigated in the EU co-ordinated programme, calculations can be done based on consumption figures from the World Health Organisation (Standard European Diet). A realistic exposure assessment for those pesticides representing a chronic risk should not be carried out with the highest residues found, but more correctly with the average residues or, to consider worst case conditions, on the basis of the 90th percentile[30]. The 90th percentile of the amount of residues found in the monitoring exercise is the value below which 90 % of the values are situated, including those samples with no detectable residues (see calculation example in the footnote)[31]. The risk assessment was carried out for an adult with an average bodyweight of 60 kg. The intake of a specific pesticide via a specific commodity was calculated and compared with the ADI. The results (as a percentage of the ADI) are given in Table 20. No refinement factor for edible portion has been applied.

Table 20: Exposure assessment for chronic risk from the dietary intake of pesticide residues (based on the 90th percentile), calculated for an adult (60 kg bodyweight), in those commodities of the co-ordinated programme in which the highest residues of the respective pesticides were found, and where the 90th percentile was above 0.01 mg/kg

Compound	Food item	90th percentile (mg pesticide / kg commodity)	ADI[32] (mg pesticide / kg body weight/day)	Average consumption (kg commodity / day)[33]	Intake via specific commodity (mg pesticide / day / kg body weight)[34]	Intake in % of the ADI
Acephate	Peaches/Nectarines	≤ 0.01	0.01	--	--	--
Aldicarb	Carrots	≤ 0.01	0.003	--	--	--
Aldicarb	Potatoes	≤ 0.01	0.003	--	--	--
Azinphos-methyl	Peaches/Nectarines	≤ 0.01	0.005	--	--	--

[30] WHO/FSF/FOS/97.7, p. 14

[31] Example: the 90th percentile for the content of residues of the captan in pears is to be determined: 1034 samples were analysed in total in the EU and EEA States, out of which 912 samples contained no detectable residues. 122 samples showed different residue contents, categorised in 9 categories (cat.1: up to 0.01 mg/kg, cat. 2: 0.011-0.020 mg/kg, cat. 3: 0.021-0.050 mg/kg, cat. 4: 0.051-0.1 mg/kg, cat. 5: 0.11-0.2 mg/kg, cat. 6: 0.21-0.5 mg/kg, cat.7: 0.51-1, cat.8: 1.1-2. cat.9: 2.1-5). 90 % of all values would comprise 1034*0.9=930.6samples. Since 912 samples are without residues and 122 samples have residue contents between the reporting limit and 5 mg/kg, the 930th /931st sample falls within the samples of category 2 (0.011-0.02 mg/kg). Because of the categorised reporting format the exact 90th percentile value can not be given, but the 90th percentile can be given as ≤ 0.02 mg/kg as the upper limit of category 7 is 0.02 mg/kg.

[32] WHO/PCS/2002.3

[33] GEMS/FOOD Regional diets WHO/FSF/FOS 98.3 Revision September 2003

[34] Calculated only if the 90th percentile is above the general reporting limit of 0.01 mg/kg of the agreed format

Compound	Food item	90th percentile (mg pesticide / kg commodity)	ADI[32] (mg pesticide / kg body weight/day)	Average consumption (kg commodity / day)[33]	Intake via specific commodity (mg pesticide / day / kg body weight)[34]	Intake in % of the ADI
Azoxystrobin	Spinach	≤ 0.01	--	--	--	--
Benomyl group	Spinach	≤ 0.01	0.03[35]	--	--	--
Bromopropylate	Oranges/mandarins	≤ 0.01	0.03	--	--	--
Captan	Pears	**< 0.02**	0.1	0.0113	0.000004	0.004
Chlorothalonil	Peaches/Nectarines	≤ 0.01	0.03		--	--
Chlorpyriphos	Spinach	≤ 0.01	0.01	--	--	--
Chlorpyriphos-methyl	Peaches/Nectarines	≤ 0.01	0.01	--	--	--
Cypermethrin	Spinach	≤ 0.01	0.05	--	--	--
Deltamethrin	Spinach	≤ 0.01	0.01	--	--	--
Diazinon	Carrots	≤ 0.01	0.002	--	--	--
Dichlofluanid	Spinach	≤ 0.01	0.3	--	--	--
Dicofol	Oranges/mandarins	**≤ 0.05**	0.002	0.0298 0.006	0.00002	1
Dimethoate	Bananas	≤ 0.01	0.002	--	--	--
Endosulfan	Spinach	≤ 0.01	0.006	--	--	--
Folpet	Pears	≤ 0.01	0.1	--	--	--
Imazalil	Oranges/mandarins	**≤ 5**	0.03	0.0298 0.006	0.00248	8.27
Iprodione	Peaches/Nectarines	**≤ 0.1**	0.06	0.0125 0.0063	0.00002	0.03
Lambda-cyhalothrin	Beans	≤ 0.01	0.005	--	--	--

35 ADI of carbendazim, as this pesticide has the lowest ADI of the three pesticides (carbenazim, benomyl, thiophanate-methyl) detected as carbendazim

Compound	Food item	90th percentile (mg pesticide / kg commodity)	ADI[32] (mg pesticide / kg body weight/day)	Average consumption (kg commodity / day)[33]	Intake via specific commodity (mg pesticide / day / kg body weight)[34]	Intake in % of the ADI
Malathion	Oranges/mandarins	**≤ 0.05**	0.3	0.0298 0.006	0.00002	0.008
Maneb-group	Spinach	**≤ 0.1**	0.03/ 0.007[36]	0.002	0.000003	0.01 0.04
Mecarbam	Oranges/mandarins	≤ 0.01	0.002	--	--	--
Metalaxyl	Oranges/mandarins	≤ 0.01	0.08	--	--	--
Methamidophos	Beans	≤ 0.01	0.004	--	--	--
Methidathion	Oranges/mandarins	**≤ 0.2**	0.001	0.0298 0.006	0.00009	10
Methiocarb	Beans	≤ 0.01	0.02	--	--	--
Methomyl	Spinach	≤ 0.01	0.02	--	--	--
Omethoate	Beans	≤ 0.01	--	--	--	--
Oxydemeton-methyl	Spinach	≤ 0.01	--	--	--	--
Parathion	Peaches/Nectarines	≤ 0.01	0.004	--	--	--
Permethrin	Pears	≤ 0.01	0.05	--	--	--
Phorate	Carrots	≤ 0.01	0.0005	--	--	--
Pirimiphos-methyl	Peaches/Nectarines	≤ 0.01	0.03	--	--	--
Procymidone	Peaches/Nectarines	≤ 0.01	0.1	--	--	--
Propyzamide	Spinach	≤ 0.01	--	--	--	--
Thiabendazole	Oranges/mandarins	**≤ 2**	0.1	0.0298 0.006	0.00099	1
Tolylfluanid	Pears	**≤ 0.1**	0.08	0.0113	0.00002	0.02

36 Group ADI for maneb, mancozeb, metiram, zineb 0.03 propineb 0.007

Compound	Food item	90th percentile (mg pesticide / kg commodity)	ADI[32] (mg pesticide / kg body weight/day)	Average consumption (kg commodity / day)[33]	Intake via specific commodity (mg pesticide / day / kg body weight)[34]	Intake in % of the ADI
Triazophos	Oranges/mandarins	≤ 0.01	0.001	--	--	--
Vinclozolin	Beans	**≤ 0.02**	0.01	0.0012	0.0000004	0.004

As shown by the results in Table 20, the intake of pesticide residues remains clearly below the ADI in any case. The exposure ranges from 0.004 % of the ADI for captan on pears, to 10 % of the ADI for methidathion on oranges/mandarins.

5.6.2. Acute risk

Currently, there is no universally accepted methodology for evaluating risks from acute exposure. However, as an example, the acute risk can be evaluated by using the UK Consumer Exposure Model, where an exposure assessment is carried out based on the 97.5th percentile of consumption[37]. That means, in order to include consumers with a high consumption of specific commodities, a large portion value is used. The 97.5th percentile is the value below which the consumption of 97.5 % of all consumers is situated.

For the 2002 co-ordinated programme, the evaluation of the acute risk was carried out for those pesticides which have acute toxicity and where acute Reference Doses (acute RfDs) have been set. The highest residue found in a composite sample was used in this calculation. In order to consider worst case conditions a default variability factor of seven[38], taking into account unit-to-unit variability of single units, was used for the medium sized crops with a unit weight ≤ 250 g (e.g. peaches). For beans, with a unit weight < 25 g a variability factor of 1 has been used. In case of spinach the evaluation has been done with two variability factors 7 for unit weight ≤ 250 g and 1 considering composite sample residue data reflect residue levels in the food as consumed[39]. For aldicarb in potatoes, a variability factor of 3, based on supervised trials, has been used, as proposed by the Rapporteur Member State for aldicarb under Council Directive 91/414[40].

For thiabendazole and methidathion in orange/mandarins evaluations have been performed using the average homogeneity factor reported by participating countries as shown in Table 19. In these two cases, in order to refine the exposure assessment, refinement factors for the edible portion have also been applied, due to the fact that analyses on oranges are performed on the whole fruit including peel, whereas studies have shown that the residues are mainly concentrated in peel. The following specific factors for pesticide have been applied: 0.05 for

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[37] UK 1998, Technical Policy on the Estimation of Acute Dietary Intakes of Pesticide Residues, AAHL/3/1998, 13 January 1998, PSD, York

[38] 2002 Joint FAO/WHO meeting on Pesticide Residues, Italy 2002, p.16

[39] Document SANCO/3346/2001 "Proposal on notification criteria for pesticide residue findings to the RASFF"

[40] Official Journal No L 230, 19/08/1991 p. 0001-0032

thiabendazole and 0.10 for methidathion, given that 95% of residues of thiabendazole is reported to concentrate in the peel, while for methidathion it is 90%.[41]
On the basis of those data, an exposure assessment for an adult (16-64+years) of 70.1 kg and a toddler (1.5-4.5 years) of 14.5 kg have been carried out and the intake of the specific pesticide via a specific commodity was compared with the acute Reference Dose (acute RfD)[42]. The results are shown in Table 21.

Table 21: Exposure assessment for acute risk from the pesticides investigated in the 2002 co-ordinated programme for the products with the highest residues found in a composite sample in the European Union. The calculation was performed with the UK Consumer Exposure Model for an adult (70.1-kg) and a toddler (14.5-kg) and only those pesticides, which have acute toxicity, and where an acute Reference Dose has been set.

Compound	**Food item**	**Maximum residue found in a composite sample (mg pesticide / kg commodity**	**acute Reference Dose (mg pesticide / kg body weight)[43]**	**97.5th percentile of consumption (kg commodity / day)[44]**	**Homog-eneity factor**	**Intake via specific commodity (mg pesticide / day / kg body weight)**	**Intake in % of the acute Reference Dose**
Acephate	Peach	1.44 *EC-MRL: 0.02-0.2**	0.05	0.228 (adult)/ 0.144 (toddler)	7	0.0182 (adult)	36% (adult)
						0.0798 (toddler)	160% (toddler)
Aldicarb	Carrots	0.10 *EC-MRL: 0.1*	0.003	0.226 (adult)/ 0.104 (toddler)	7	0.0010 (adult)	34% (adult)
						0.0040 (toddler)	134% (toddler)
Aldicarb	Potatoes	0.10 *EC-MRL: 0.5*	0.003	0.684 (adult)/ 0.227 (toddler)	3	0.0016 (adult)	53% (adult)
						0.0045 (toddler)	151% (toddler)
Chlorpyri-	Spinach	6 *EC-MRL:*	0.1	0.266 (adult)/	1	0.0228 (adult)	23% (adult)

[41] JMPR-1992 Joint FAO-WHO, Pesticides Residues in food–Part I Residues Evaluation Methidathion and JMPR-1997 Evaluation Thiabendazole
[42] Consumer Exposure Model, UK
[43] WHO/PCS/2002.3
[44] Consumer Exposure Model, UK
* applicable from 1st September 2002

Compound	Food item	Maximum residue found in a composite sample (mg pesticide / kg commodity	acute Reference Dose (mg pesticide / kg body weight)[43]	97.5th percentile of consumption (kg commodity / day)[44]	Homog-eneity factor	Intake via specific commodity (mg pesticide / day / kg body weight)	Intake in % of the acute Reference Dose
phos		*0.05*		0.031(toddler)		0.0128 (toddler)	13% (toddler)
					7	0.0690 (adult)	69% (adult)
						0.0898 (toddler)	90% (toddler)
Diazinon	Carrots	0.77 *EC-MRL: 0.2*	0.03	0.226 (adult)/ 0.104(toddler)	7	0.0078 (adult)	26% (adult)
						0.0031 (toddler)	103% (toddler)
Endosulfan	Spinach	1 *EC-MRL: 0.05*	0.02	0.266 (adult)/ 0.031(toddler)	1	0.0038 (adult)	19% (adult)
						0.0021 (toddler)	11% (toddler)
					7	0.0115 (adult)	57% (adult)
						0.0150 (toddler)	75% (toddler)
Lamba-cyalothrin	Beans	0.17 EC-MRL: 0.2	0.0075	0.267 (adult)/ 0.064 (toddler)	1	0.0006 (adult)	9% (adult)
						0.0008 (toddler)	10% (toddler)
Methamido-phos	Beans	10.80 *EC-MRL: 0.5*	0.01	0.267 (adult)/ 0.064(toddler)	1	0.0411 (adult)	411% (adult)
						0.0477 (toddler)	477% (toddler)
Methidathion	Oranges	1.88 *EC-MRL: 2*	0.01	0.262 (adult)/ 0.181 (toddler)	5.9[45]	0.0027[46] (adult)	27% (adult)
						0.0125[46] (toddler)	125% (toddler)
Methiocarb	Beans	20 EC-MRL: Not set	0.02	0.267 (adult)/ 0.064(toddler)	1	0.0762 (adult)	381% (adult)
						0.0883 (toddler)	441% (toddler)
Methomyl	Spinach	6.10 EC-MRL: 2	0.02	0.266 (adult)/ 0.031(toddler)	1	0.0231 (adult)	116% (adult)

[45] in this case a homogeneity factor has been applied taken from experimental data shown in Table 19

[46] a refinement factor of 0.10 has been applied for edible portion as explained in the text at pg.53

Compound	Food item	Maximum residue found in a composite sample (mg pesticide / kg commodity	acute Reference Dose (mg pesticide / kg body weight)[43]	97.5th percentile of consumption (kg commodity / day)[44]	Homog-eneity factor	Intake via specific commodity (mg pesticide / day / kg body weight)	Intake in % of the acute Reference Dose
						0.0130 (toddler)	65% (toddler)
					7	0.0701 (adult)	351% (adult)
						0.0913 (toddler)	456% (toddler)
Oxydemeton-methyl	Spinach	0.54 EC-MRL: 0.02[47]	0.002	0.266 (adult)/ 0.031(toddler)	1	0.002 (adult)	102% (adult)
						0.0012 (toddler)	58% (toddler)
					7	0.0062 (adult)	310% (adult)
						0.0081 (toddler)	404% (toddler)
Parathion	Peaches	0.29 EC-MRL: 0.2-0.05[48]	0.01	0.228(adult)/ 0.144(toddler)	7	0.0037 (adult)	37% (adult)
						0.0161 (toddler)	161% (toddler)
Thiabendazole	Oranges	11 EC-MRL: 5	0.1	0.262(adult)/ 0.181 (toddler)	2[49]	0.0033[50] (adult)	3% (adult)
						0.0129[50] (toddler)	13% (toddler)
Triazophos	Oranges	0.05 *EC-MRL: 0.02*	0.001	0.262(adult)/ 0.181 (toddler)	7	0.0009[51] (adult)	87% (adult)
						0.0039 (toddler)	393% (toddler)

As Table 21 shows, the estimated intakes for the highest residues in a composite sample have often been assessed above the acute RfD, mainly in the case of evaluation of toddlers' exposure.

The range in case of adults' exposure goes from 3% to 411% of the acute RfD while in case of toddlers it ranges from 10 to 477% of the acute RfD.

[47] applicable from January 2003

[48] applicable from January 2003

[49] in this case a homogeneity factor has been applied taken from experimental data as shown in Table 19

[50] a refinement factor of 0.05 has been applied for edible portion as explained in the text at pg.53

[51] no factor for edible portion has been applied because there were no available data

In the case of triazophos, the acute RfD is 0.001 and the intake in % of the acute Reference Dose is 393% for toddlers. However, this calculation has been done without a reduction factor for the distribution of residues between pulp and peel as these data were not available for triazophos. Calculation with such a factor would have greatly reduced the value. Moreover, the MRL is already fixed at the Limit of Determination and Commission Regulation 2076/2002/EC has established the withdrawal of authorisations by July 2003.

In the case of aldicarb and methidathion the MRLs were not exceeded, but exposure for toddlers was above the acute RfD. As established by Council Decision 2003/199/EC aldicarb has not been included in Annex I of 91/414 and the authorisations have been withdrawn in 2003, with derogations given for specific uses in some Member States, applicable until 2007. In the case of methidathion it has not been included in Annex I to Commission Decision 2004/129/EC and the authorisations are withdrawn by September 2003 with some derogations for specific uses in some Member States.

In case of oxydemeton-methyl in spinach and parathion in peaches, new MRLs are in place from January 2003 and have been set at the limit of determination of 0.02 and 0.05, respectively.

On basis of the results of the acute exposure assessment a health risk cannot be excluded, especially for vulnerable groups.

Only one of the above cases where the MRLs were significantly exceeded has been notified via the Rapid Alert System in 2002.

6. SAMPLING

Commission Directive 79/700/EEC[52] established sampling methods for the official control of pesticide residues in and on fruit and vegetables. Member States are supposed to follow these methods for their pesticide residue monitoring. Furthermore, Table 22 shows the information given in the summaries of the national monitoring reports of the Member States and EEA States on sampling. In most cases, sampling followed annual national plans that were usually established taking into consideration consumption, production, share of imported and exported products as well as risks (e.g. results from previous years).

Table 22 shows the distribution of domestic/imported samples and the relationship of the number of samples taken to population size.

For the first time in 2002, participating countries were requested to report the total number of samples of products imported, specifying the amount from other member states of the EU and from third countries. The majority of the countries were in a position to provide this detailed data, as shown in Table 23.

The share of domestic and imported samples should reflect the situation in the respective national market. In total, about 59 % of the samples were domestic samples and approximately 41% were imported samples, including those from other EU Member States.15% of imported samples are confirmed as originating from other Member States and

[52] From 1.1.2003 Commission Directive 79/700/EEC has been repealed by Commission Directive 2002/63/EC

14% from third countries. A further 12% were imported but it is not possible to define the origin, while 0.25 % were of unknown origin.

Comparing these data with those of 2001, the average of samples taken per 100.000 inhabitants remains the same. There has been an increase in the share of domestic samples from 39% to 59% with a decrease in those of unknown origin from 21% in 2001 to 0.25% in 2002.

More detailed information can be found in the summaries of the national monitoring reports in Annex 1.

Samples were taken at different points, such as wholesalers and retailers, local and central markets, points of entry (for imported products), and processing industries.

Table 22: Summary on sampling by the national authorities (information taken from the two-page summaries which are included in Annex I)

Country	Summary on sampling
B	Sampling was carried out by trained officers mostly according to Commission Directive 79/700/EEC, at auctions, importers, wholesalers, processors and exceptionally in retail. The sampling plan took account of average consumption, production figures, results of previous years, analytical and budgetary possibilities and other useful information.
DK	The sampling plan took account of dietary consumption, production, import data and monitoring results from previous years. The samples were taken mainly at wholesalers and importers, food processing companies, shops and producers. Sampling was carried out according to new Commission Directive 2002/63/EC.
D	Samples were taken at the level of producers, manufacturers, wholesalers, retailers and restaurants, according to a national sampling protocol published as official legal regulations by trained officers.
EL	An annual sampling plan was set on the basis of productions and trade data, dietary intakes of commodities, analytical capacity of laboratories. Samples were randomly taken from points of entry, wholesalers, retailers and farm gates. Sampling was carried out according to Directive 79/700/EEC.
E	Samples were taken from domestic crops at production and wholesalers level, following Directive 79/700/EEC. Samples were taken proportional to production, taking into account the EU co-ordinated programme and specific actions with regard to certain crops.
F	The general sampling programme is drawn up by the central authority and takes account of national and European priorities, the dietary proportion of plant products, the EU co-ordinated programme, previous results and targeted inspection on certain fruits and vegetables (tropical root crops, tea, cereals, baby food, leafy vegetables). Samples are taken by trained inspectors at market, retail, wholesale, point of entry and less to producers.
IRL	The sampling plan is finalised taking account of Irish adult dietary information, results of previous plans, manner of consumption of the various commodities, analytical capability, targeted cases of previous exceedances. Sampling is done according to Codex procedure mainly at wholesale level.
I	A national annual sampling plan is set on the basis of productions and consumption data. Samples are taken mainly at wholesale market, distribution centres, supermarkets.
L	Samples were taken according to an annual sampling plan. Imported products were sampled at wholesaler distribution points, local products were sampled at retailers at the central market in the City of Luxembourg and at producers. Due to limited resources it was limited to the EU co-ordinated programme and to few commodities which were considered more risky. As far as practicable, sampling was done according to Directive 79/700/EEC.
NL	The samples are taken without prior information about the presence of pesticides and, therefore, represent the situation on the market for the product at that time. But sampling is directed relatively more to products where previous results indicated MRL

Country	Summary on sampling
	violations. As required by Council Directive 90/642/EEC, a monitoring plan is made. Directive 2002/63/EC (as transposed into national law) was respected. The monitoring program is primarily directed to major products in the consumption pattern, but some capacity is reserved for minor products. In the monitoring program special attention was given to chlormequat on pears, because of the high level of exceedances in 1999.
A	Sampling was based on a nation-wide sampling plan, taking into account data concerning dietary consumption, production and import of fruit and vegetables, results of former measurements as well as analytical and budgetary capacities. In addition were included targeted commodities with higher risk identified in previous years or related to RASFF notifications.
P	The national programme for fruits and vegetables was based on the EU co-ordinated programme, complemented selections based on consumption and results of previous years. Less important crops were sampled as part of a rolling programme. The numbers of samples and pesticides analysed were planned according to the analytical capabilities and available resources in the participating laboratories. Samples were taken mostly at wholesale commerce and wholesalers' warehouses. Grain cereals were often sampled from milling plants and ports of entry. Sampling carried out according to Directive 79/700/EEC.
FIN	The national and EC co-ordinated pesticide residues monitoring was carried out according to an annual program. Priorities were decided on the basis of consumption figures and known residues problems. Domestic samples were collected from farms or retail shops. The majority of imported food samples were taken by Customs inspectors, from wholesalers. The sampling procedure of Directive 79/700/EEC was followed as far as practicable.
S	The target number of samples to be collected of each food is roughly proportional to the food's consumption rate and takes into account both the amount of domestic production and the amount of imports from EU countries and third countries. However, the number is also based on the importance of the foodstuff in the diets of infants and young children as well as residues found in prior samples. Samples were taken at wholesale warehouses and retail.
UK	The sampling plan was based on a main commodity-rolling programme, taking into account levels of consumption, information on possible levels of residues and the need to ensure that a wide range of commodities is included. Directive 2002/63/EC followed where practicable. [Data from other sources including publications produced by other UK Agriculture departments, data published by other governments, as well as data and intelligence from industry and other sources are used in determining the surveillance programme.]
Norway	Samples were taken mainly from wholesaler's warehouses but also from at retail outlets and farmgate. The number of surveillance samples of each commodity does not reflect their share of the market, as more samples were taken of commodities suspected to contain residues. Trained officers carried out sampling.
Iceland	Samples are taken, according to an official monitoring program, at wholesaler's warehouses. Sampling is focused on imported products mainly since fruits for commercial purposes are not grown in Iceland and a great part of vegetables are

Country	Summary on sampling
	imported.
Liechtenstein	The sampling plan is based on domestic production and the ESA[53] co-ordinated programme. The programme started in the second half of 2002. Samples of fresh fruits, vegetables and cereals were collected mostly from retailers, but also from farms and food processing plants, mostly in accordance with Directive 79/700/EEC.

[53] EFTA Surveillance Authority

Table 23: Number and origin of the samples taken by country (**sum of surveillance and follow-up enforcement samples)**, sum of fresh (incl. frozen) fruit, vegetables, cereals and processed products.

Con-try	Total number of samples taken	Samples taken per 100,000 inhabitants	No. of domes-tic samples taken	%	No. of samples from OMS[54]	%	No. of samples from TCs[55]	%	OMS or TC	%	Origin not known	%
B	1082	10	694	64	169	16	104	10			115	11
DK	2147	40	682	32	886	41	579	27				
D	7035	9	3338	47	n.a.	n.a.	n.a.	n.a.	3697	53		
EL	2061	20	1742	85	10	0	309	15				
E	4049	10	4049	100	0	0	0	0				
F	3780	6	2739	72	558	15	483	13				
IRL	617	16	137	22	251	41	229	37				
I	8882	15	8094	91	309	3	479	5				
L	125	28	35	28	75	60	15	12				
NL	3326	21	1367	41	884	27	1075	32				
A	1637	20	475	29	969	59	193	12				
P	831	8	591	71	176	21	64	8				
FIN	2317	45	430	19	497	21	1390	60				
S	2369	27	639	27	861	36	869	37				
UK	2950	5	1061	36	20[56]	n.a.	n.a.	n.a.	1869	63		
Norway	2604	58	905	35	913	35	786	30				
Iceland	293	102	42	14	148	51	103	35				
Liechtenstein	47	140	39	83	4	9	4	9				
Total	**46152**	**12**	**27059**	**59**	**6730**	**15**	**6682**	**14**	**5566**	**12**	**115**	**0.25**

[54] Other Member States
[55] Third Countries
[56] This relates to enforcement samples only.

7. QUALITY ASSURANCE

Council Directive 90/642/EEC, as amended by Council Directive 97/41/EC, requires Member States to control maximum residue levels according to Council Directives 89/397/EEC and 93/99/EEC. This also means that laboratories have to comply with the European Standard EN 45001[57] and that Member States are requested to assess the laboratories by applying the criteria as laid down in European Standard EN 45002. Member States shall also apply proficiency testing schemes where appropriate.

Commission Recommendation 2002/1/EC lays down that Member States, should provide information about the details of accreditation of the laboratories which carry out the analyses for the monitoring exercise, about the application of the EU Quality Control Procedures and about their participation in proficiency and ring tests. It also requires the countries contributing to the monitoring to provide the accreditation certificates. Workshops on Analytical Quality Control (WAQC) are regularly held in order to review the Quality Control Procedures. Proficiency tests, supported by the European Commission, are also regularly organised (so far, 5 proficiency tests have been organised, the last was carried out in 2003).

The European Commission's Monitoring Regulation No. 645/2000 (cf. chapter 2), in force since April 2000, ensures the financial contribution of the European Commission to the organisation of proficiency tests and Analytical Quality Control workshops. It also confirms and further specifies the requirements for accreditation of monitoring laboratories and their participation in proficiency tests.

Table 24 and Figures 11 - 13 give an overview of the situation regarding accreditation of monitoring laboratories and participation in proficiency tests. Table 24 is a summary of the information provided by all Participating countries in their short written summaries (cf. Annex 1 for further details) and in Table G of the guidance document SANCO 11/2003.

The overall situation of the laboratories has slightly improved from 2001 as shown in Fig.11. There are 3 countries out of 18 that have no accredited laboratory (17%) while 11 out of 18 have accredited all their laboratories (61%).

In the EU and EEA States a total of 46,152 samples (sum of fresh and processed products) were analysed and, of these, approximately 76% were analysed by laboratories accredited for the most important pesticide-commodity combinations and around 24 % were analysed by non-accredited laboratories. This is illustrated in Figure 12.

By comparison with 2001, the percentage of samples analysed by accredited/partly accredited laboratories has slightly increased from 75.4% to 75.6%.

The breakdown of the samples analysed by accredited/not accredited laboratories by country is shown in Figure 13.

[57] Now ISO 17025

Status of laboratory accreditation: Percentage of countries with accreditation of all, of some or of none of the monitoring laboratories in 2002 compared to previous years:

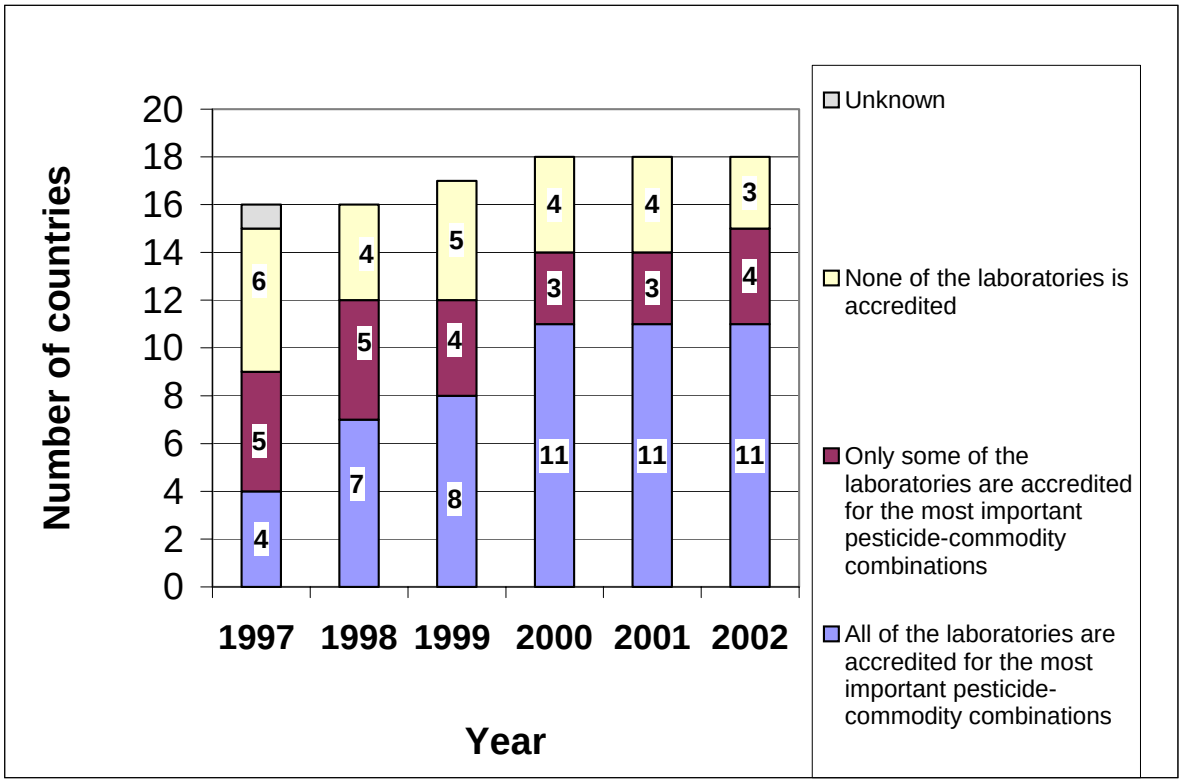

Figure 11: Number of countries with accreditation of all monitoring laboratories, of some monitoring laboratories and of none of the monitoring laboratories.

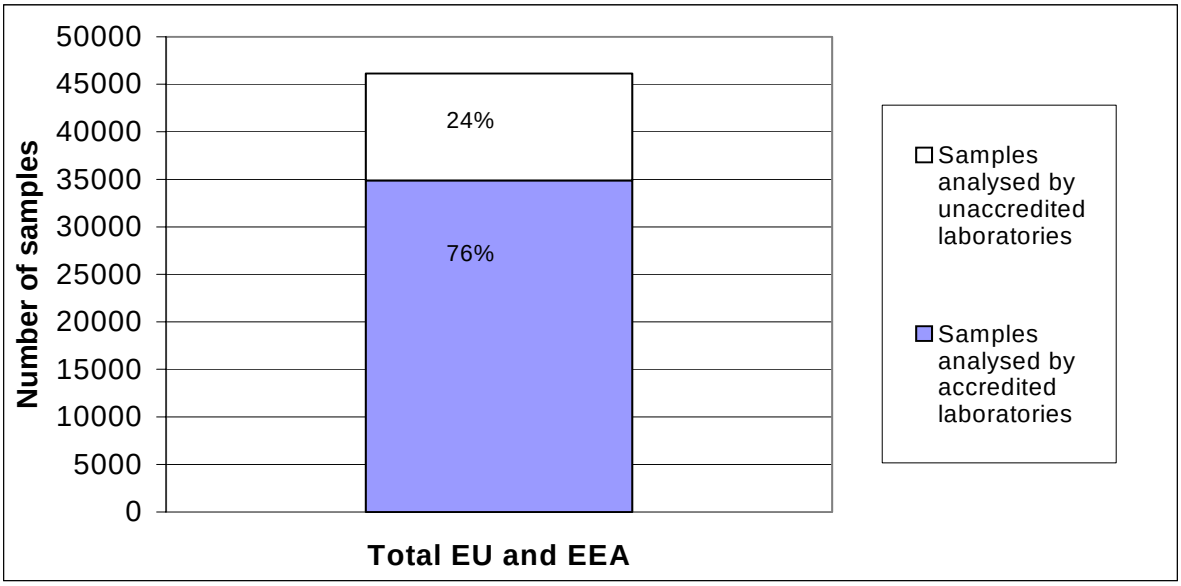

Figure 12: Numbers of samples analysed by laboratories accredited for the most important pesticide-commodity combinations and/or for only some pesticide-commodity combinations or by not accredited laboratories in the EU and EEA States in the year 2002

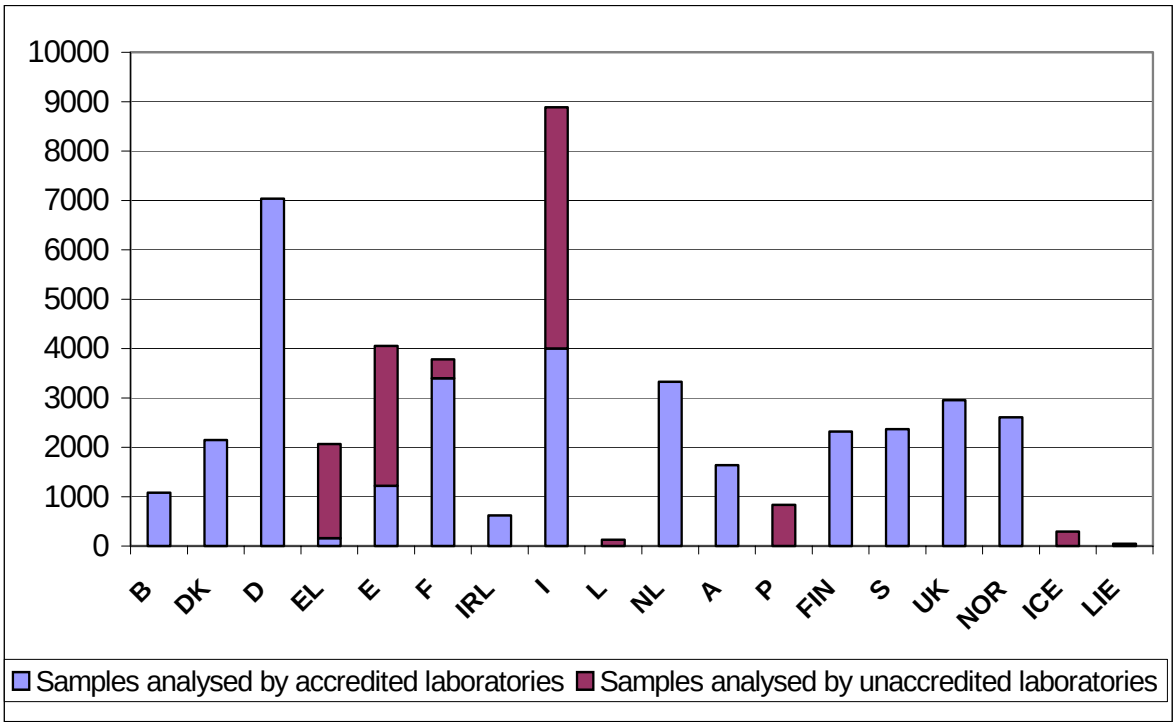

Figure 13: Numbers of samples analysed by laboratories accredited for the most important pesticide-commodity combinations and/or for only some pesticide-commodity combinations or by not accredited laboratories by country in the year 2002

In addition to the information on accreditation of laboratories, Table 24 gives an overview on other laboratory quality issues, such as the implementation of the EU QC procedures and the participation in proficiency tests. 17 out of 18 countries reported on this issue while 1 country did not give any specific information. According to this information, 10 out of the 18 reporting countries have fully implemented at least 70% of the EU QC procedures. The remainder of the QC procedures is partly or fully implemented in most of the countries.

All of these 17 reporting countries also took part in proficiency tests in 2002. 14 out of 17 have participated in the EU proficiency test organised in 2002 while another often-used proficiency test scheme was FAPAS[58] (13 countries took part in some of the FAPAS rounds in 2002). Some countries also took part in other nationally or internationally organised proficiency tests (BIPEA, NFA, etc.).

[58] Food analysis performance assessment scheme, a proficiency testing scheme organised by the UK

Table 24: Accreditation, participation in proficiency tests and implementation of the EU Quality Control Procedures of the pesticide residue laboratories

* Not applicable, because not yet accredited

Country	No. of laboratories	Accreditation	Accredi-tation certifi-cates provided	Participation in proficiency tests	Implementation of EU Quality Control Procedures (QC procedures)
B	3	Accredited by BELTEST	Yes	1 laboratory took part in chlormequat proficiency test and 2 in FAPAS and EU PT4[59]	All three laboratories have fully implemented from 70 to 90 % of the QC procedures, remaining percentage partly implemented.
DK	2 (1 main lab performing 97 % of all analyses)	Accredited by DANAK	Yes	FAPAS and EU PT4	In both laboratories fully implemented from 70 to 90 % of the QC procedures, remaining percentage partly implemented.
D	33	Accredited by AKS SAL	No	FAPAS, GC-Multhiresidues method, EU PT4, other national PT	Different status of the QC procedures full implementation between 50% and 100%
EL	7	1 accredited by E.Sy.D and the other in preparatory phase	No	EU PT4	All parts of the QC procedures are implemented, at least 40% fully.
E	14	4 ENAC accredited laboratories (doing approx. 30 % of the analyses). The others are in the preparatory phase.	Yes	National tests – BIPEA PT[60]	All or parts of the QC procedures are implemented
F	6	5 laboratories, which performed around 90 % of the analyses, are fully accredited by COFRAC	Yes	BIPEA- FAPAS-NFA[61]-EU PT4	At least 80 % of the QC procedures are fully implemented
IRL	1	Accredited by NAB	Yes	FAPAS- EU PT4	At least 60 % of the QC procedures are fully implemented
I –data from 2000 report as no new data were provided)	60	17 laboratories out of 60 are accredited, performing approx.45% of the analyses	No	No information	No information

[59] 4th European Proficiency Test 2002

[60] Proficiency tests organised by the Bureau Interprofessionnel d'Etudes Analitiques

[61] Proficiency tests organised by the National Food Administration of Sweden

Country	No. of laboratories	Accreditation	Accredi-tation certifi-cates provided	Participation in proficiency tests	Implementation of EU Quality Control Procedures (QC procedures)
L	1	In preparatory phase for accreditation	--*	FAPAS- EU PT4	At least 40 % of the QC procedures are fully implemented
NL	1	Accredited by RvA	Yes	FAPAS – EU PT4	All of the QC procedures are fully implemented
A	4	Accredited by BMWA and AKS	Yes	EU PT4- other national tests	All or at least 80% of the QC procedures are fully implemented
P	3	None of the laboratories accredited yet	--*	Two of the labs participated in FAPAS- EU PT4	Different status of the QC procedures full implementation between 10% and 80%
FIN	2	Accredited by FINAS	Yes	FAPAS- EU PT4	At least 70 % of the QC procedures are fully implemented
S	1	Accredited by SWEDAC	Yes	NFA- FAPAS- EU PT4	At least 70 % of the QC procedures are fully implemented
UK	2	Accredited by UKAS	Yes	FAPAS – EU PT4	Fully implemented
Norway	1	Accredited by NA	Yes	FAPAS- NFA- EU PT4	80 % of the QC procedures are fully implemented
Iceland	1	In preparatory phase	--*	FAPAS	Approx. 80% of the QC procedures fully implemented, 20% not implemented
Liechte nstein	2	Accredited by DACH and SAS	Yes	Chemical analyses	At least 90 % of the QC procedures are implemented

8. RAPID ALERT SYSTEM

The Rapid Alert System for Food and Feed (RASFF) was established by Council Directive 92/59/EEC[62] on General Product Safety[63]. In February 2002, new provisions entered into force as laid down in Regulation (EC)178/2002[64] of the European Parliament and of the Council.

Member States shall immediately notify the Commission under the Rapid Alert System whenever they have any information relating to the existence of a serious direct or indirect risk to human health deriving from food and feed and whenever they adopt measures to prevent the use of products entailing a serious risk to the health and safety of the consumer. Such notifications are classified as ALERT notifications. Consequently, the Commission notifies the Alert to the contact points in all Member States, which should take appropriate action and inform of any measure adopted.

Notifications which do not fulfil the above requirements but which are nevertheless regarded as important information, are forwarded by the Commission to the contact points in the Member States as information notifications (NON-ALERTS).

In 2002, the total number of **ALERT** notifications regarding pesticide residues was 43 and **NON-ALERTS** totalled 129. Among the ALERTS, 28 were related to products originated in Member States and 15 to products from Third Countries. With regard to the NON-ALERTS, 84 concerned products from Member States and 45 were related to products from Third Countries.

Fruit and vegetables were the main commodities concerned, accounting for 36 ALERTS and 92 NON-ALERTS. Among the remaining commodities, the most noteworthy notifications concerned tea (4 NON-ALERTS), cereals (6 of which : 4 NON-ALERT and 2 ALERT for nitrofen), processed and animal origin products, these last mainly related to the detection of residues of nitrofen in eggs (NON-ALERT 8) and in various meat products (4 NON-ALERT and 1 ALERT).

For fruit and vegetables, there were two main problems notified in relation to chlormequat and metamidophos residues.

For chlormequat there were 20 ALERTS and 40 NON-ALERTS, mainly on products coming from Italy : carrots 9 ALERTS and 34 NON-ALERTS, pears 2 ALERTS and 1 NON-ALERT, tomatoes 7 ALERTS. In addition, high levels of chlormequat residues were notified on peppers originating in Spain (4 NON-ALERTS) and in baby foods - 2 ALERTS (products originating in France and Switzerland) and 1 NON-ALERT (product originating in Germany).

Metamidophos was notified in 27 cases: in peppers from Turkey 8 ALERTS and 10 NON-ALERTS, from Thailand 3 NON-ALERTS, from Greece 1 NON-ALERT, from Egypt 1 NON-ALERT and from Spain 1 ALERT. In addition, metamidophos was also notified in beans from Thailand - 1 NON-ALERT and in Yardlong peas, 1 NON-ALERT.

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[62] Official Journal No. L 228, 11/08/1992 p. 0024 - 0032

[63] This Directive has been replaced by Directive 2001/95/EC of the European Parliament and of the Council from January 2004

[64] Official Journal No. L 31, 01/02/2002 p. 0001 - 0024

Beyond the above-mentioned, the pesticides which were subject of ALERTS were Monocrotophos (1 on okra from Suriname and 1 on cherries from Spain), cyprodinil (1 on pepper from Turkey and 1 on tomato from Italy), phosmet (2 on peaches from Spain), endosulfan (1 on celery from Italy), acephate (1 on nectarines from Spain), methiocarb (1 on pepper from Greece), methomyl (1 on spinach from Spain), DDT (1 on wheat from Ukraine) and various other cases.

The number of ALERTS and NON-ALERTS has increased significantly compared to 2001, where 13 ALERTS and 61 NON-ALERTS were issued. This does not necessarily mean that the residues problem has worsened, but could be due to an increased use within the Member States of the Rapid Alert System. It could be seen as a first result of the Commission's efforts to harmonise the widely varying notification criteria with a Guidance document « Proposal on how to notify pesticide residues in foodstuffs in the Rapid Alert System for foodstuffs »(document SANCO/3346/2001), which is used on a voluntary basis and is increasingly adopted by Member States.

The rapid dissemination of information via the RASFF plays an important role in the Member States' planning of monitoring programmes, since it allows the identification of specific problems at an early stage and the adaptation of the sampling programmes accordingly, if necessary.

9. SUMMARY

9.1. National Monitoring programmes

All fifteen Member States and the EFTA States, who signed the EEA agreement[65] (Norway, Iceland and Liechtenstein), monitored pesticide residues in foodstuffs of plant origin. Overall, more than 46,000 samples were analysed for, on average, 170 different pesticides. About 92 % of the samples analysed were fresh (incl. frozen) fruit, vegetables and cereals, while about 8 % were processed products.

Residues of pesticides at or below the MRL (national or EC-MRL) were detected in 37 % of the fruit, vegetable and cereal samples and processed products. In 5.1 % of all samples, residues above the MRL (national or EC-MRL) were found, while 58 % of the samples contained no detectable residues. When only fresh products are considered, the percentage of MRL exceedances is 5.5 % and the percentage of samples with no detectable residues decreases to 56%.

Compared to previous years, the percentage of fruit, vegetable and cereals samples with no detectable residues has decreased to 56%, while the frequency of samples exceeding MRLs (national or EC-MRLs) has generally increased over the years from 1996 to 2002 varying from 3.0 % in 1996 to 5.5 % in 2002. At the same time, the percentage of samples with residues at or below the MRL (national or EC-MRL) shows an increase in recent years to a current level of 38%.

In addition, the frequency of samples with multiple residues in fresh fruit, vegetables and cereals shows an increasing tendency, rising from 14 % in 1999 to 20.7 % in 2002. In particular the percentage of samples with four or more residues is higher than in previous years (5.4 % in 2002, compared to 2, 2.2 and 2.8 % in 1998, 1999 and 2000 respectively).

The most frequently found pesticides have been reported separately for fruit and vegetable and for cereals in 2002. Like in the previous years, fungicides were mainly found on fruit and vegetables whereas on cereals the pesticides most found were insecticides. The 10 most frequently found pesticides were almost the same 10 as those reported in 2001 and 2000.

When comparing the results of the years from 1996 to 2002, it has to be taken into account that the data have not been collected under exactly the same conditions. Differences over time affect a number of factors, e.g. the number of participating countries, which rose from 16 to 18, the design and priorities set for the national programmes (the sampling may have been more or less targeted towards specific problems), the total number of samples taken, the legislation (more harmonised EU-MRLs have been set over the years, national MRLs may have changed), as well as the enhanced analytical possibilities of the laboratories.

The increase in samples exceeding the MRL for example, is likely to be partly linked to factors such as changes in MRLs set to lower limits, more sensitive analytical methods, a broader spectrum of analytes sought and better information flow within the EU via the Rapid Alert System for Food and Feed (RASFF). The RASFF is an important element in the transmission of information from country to country and allows for an early identification of potential

[65] Agreement on the European Economic Area

problems in Member States and Third Countries. It therefore facilitates adjustments of programmes and sampling priorities in the Member States towards a more targeted approach to specific problems.

9.2. EU co-ordinated monitoring programme

In the special co-ordinated programme, eight commodities (pears, bananas, beans, potatoes, carrots, oranges/mandarins, peaches/nectarines, and spinach) were analysed for 41 different pesticides. Compared to previous years, the programme has almost doubled the number of commodities evaluated and the number of pesticides detected has increased from 36 to 41.

Being a rolling programme, 4 of the commodities evaluated were the same as in 1997 and the other 4 had already been evaluated in 1998. With regard to pesticides: 12 (except DDT) of those analysed in 1997 and 20 of those analysed in 1998, were included in the group of 41 analysed in 2002.

Although the total minimum number of samples recommended in the co-ordinated programme in the EU is constant (496 samples[66] every year), in the last two years more than twice the number of samples of previous years was analysed. In this programme, about 10,046 samples were analysed. However, not every sample was analysed for all 41 pesticides.

In 44% of the samples, residues at or below the MRL (national or EC-MRLs) were found and in 3.3% of the samples MRLs were exceeded.

Residues at or below the MRL were found most often in oranges/mandarins (78 %), followed by pears (67 %), bananas (56 %) and peaches/nectarines (45%). MRLs (including national or EC-MRLs) were exceeded most often in spinach (13 %), followed by beans (7 %), oranges/mandarins (4 %), and peaches/nectarines (3 %).

The most often detected pesticide was imazalil (17 %* of all samples analysed for the substance), followed by thiabendazole (13%*), chlorpyriphos (11.5 %*), the maneb group (10 %*), benomyl group (5.7 %*) and methidathion (5.5%*). Another group of pesticides had percentages varying from 1 to less than 4 % among them iprodione (3.7%*), malathion (3.5%*), azinphos-methyl(2.7%*), procymidone (2.68%), dicofol (2.6%*), captan+folpet (2.4%*) and tolylfluanid (2.1 %*). For the majority of 23 out of 41 pesticides, the frequency of samples with residues corresponded to less than 1%.

Residues of maneb group exceeded MRLs most often (1.19% of all samples analysed), followed by bromopropylate (0.37%), dicofol (0.33%), chlorpyriphos(0.25%), thiabendazole (0.24%), imazalil (0.24%), endosulfan(0.23) and methomyl (0.22%). For 9 substances no exceedance has been reported.

The highest residues found in a composite sample were 25 mg/kg for maneb group on spinach, 20 mg/kg for methiocarb on beans, 11 mg/kg for thiabendazole on oranges/mandarins, 10.80 mg/kg for methamidophos in beans, and 8.9 mg/kg for imazalil on oranges/mandarins.

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[66] including EU Member States and Norway, Iceland and Liechtenstein

* Percentages include sum of samples with residues at or below the MRL and exceeding the MRL.

The highest frequency of exceedances for a commodity was evaluated for maneb group which most often exceeded MRLs in spinach (11.88 % of all samples), followed by bromopropylate in oranges (1.61% of all samples), endosulfan in beans (1.58% of all samples), iprodione in spinach (1.37%) and metamidophos in beans (1.02%).

The most important pesticide-commodity combination where detectable residues were found (incl. those at or below the MRL and exceeding the MRL) were imazalil on orange-mandarins and on bananas and thiabendazole on orange-mandarins and on bananas.

The comparison with data of 1997 and 1998 shows that the frequency of samples with residues at or below the MRL, for almost all of the pesticides evaluated remains at comparable levels, with some notable exceptions. The exceptions refer to benomyl group, chlorpyriphos and maneb-group in oranges whose frequencies of detections doubled in 2002. A high increase is reported also for thiabendazole and methidathion in oranges, iprodione and chlorpyriphos in peaches and carrots, but a significant decrease is reported for metalaxyl in oranges and thiabendazole in bananas.

It is evident that the commodity in which the frequency of detection of residues is greatly increased is orange/mandarins, followed by peaches and pears - except for a certain decrease in the case of residues of maneb group and endosulfan in peaches.

The percentages of exceedances are all below the 2% level except for maneb- group that, as in the past, has the highest percentages and shows a high, increased level in spinach but a decrease in carrots.

It must be borne in mind that comparison is difficult due to the fact that MRLs have changed from 1997 to 2002. For example, in the case of oranges for the 41 pesticides examined, 16 MRLs have changed since 1997 and, of these, 7 are now set at the limit of determination.

Chronic exposure assessments demonstrate that ADI[67] values were not exceeded for the examined pesticide/commodity combinations. However, for the assessment of acute exposure, the data show that the acute RfD[68] was exceeded in a number of cases and a health risk cannot be excluded, in particular for vulnerable groups.

9.3. Quality assurance and sampling

Samples for the national and the EU co-ordinated programmes were taken at different points such as retailers, wholesalers, markets, points of entry and processing industries. National sampling plans exist in most countries, taking into consideration e.g. consumption data; production figures import/export relation and risks (e.g. results from previous years).

Accreditation of laboratories has been completed in some of the countries, whereas in other countries accreditation has been achieved only for some of the laboratories. Although there was some progress in 2002 compared to 2001 in the accreditation status of laboratories, there were only 11 out of 18 countries (about 60 %) which have all their laboratories accredited. The remaining 7 countries have either some but not all of their laboratories accredited or are still in the preparation phase for accreditation.

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[67] Acceptable Daily Intake
[68] Acute Reference Dose

With regard to the monitoring samples (national and EU programmes) taken in the EU and EEA States, approximately 76% were analysed by accredited laboratories and 24% analysed by laboratories which were not accredited.

However, it can also be stated that considerable improvements have been made in the EU and EEA States with the implementation of the EU QC procedures. In the majority of the participating countries at least 70% the EU QC procedures have been fully implemented.

17 countries reported that they took part in proficiency tests in 2002. No information is available for one country. 14 out of 17 have participated in an EU proficiency test organised in 2002 and 13 countries took part in some of the FAPAS[69] rounds in 2002.

[69] Food analysis performance assessment scheme, a proficiency testing scheme organised by the UK