EUROPEAN COMMISSION
HEALTH & CONSUMER PROTECTION DIRECTORATE-GENERAL
Directorate F - Food and Veterinary Office
Unit 4 - Food of plant origin, plant health; processing and distribution
In cooperation with JRC IRMM, Food & Feed Unit and DG SANCO E1

SANCO/20/03 final

Monitoring of Pesticide Residues

in Products of Plant Origin

in the European Union, Norway, Iceland and Liechtenstein

2001 Report

This report "Monitoring of Pesticide Residues in Products of Plant Origin in the European Union, Norway, Iceland and Liechtenstein - Report 2001 - 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 11 March 2003. The Standing Committee agreed that publication was desirable and noted that this was also the view of Norway, Iceland and Liechtenstein.

March 2003

TABLE OF CONTENTS

1. INTRODUCTION

This report covers the national situations with regard to pesticide residues monitoring for the calendar year 2001 in the 15 EU Member States and the three EFTA States who have signed the EEA agreement[1] (Norway, Iceland and Liechtenstein). This document can only give an overall view on monitoring of pesticide residues. Each Member State and the EEA States have been invited to contribute a short national statement (in English) for inclusion in this document (Annex 1). More detailed information about the situation in individual countries is available from the respective national monitoring authorities and may be requested from them. Pesticide residues in foodstuffs of animal origin, as regulated in Council Directive 86/363/EEC[2], are 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 2001 Commission Directive 79/700/EEC[7] on sampling was still applicable.[8]

Besides national monitoring programmes, the Commission services recommended (via Commission Recommendation 2001/42/EC[9], in the case of 2001) 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 that makes it possible to estimate actual dietary pesticide exposure throughout Europe. The monitoring programme is designed as a rolling programme, which covers all major pesticide-commodity combinations in a series of 5-year cycles. The first cycle was completed in 2000. This 2001 report is the first report of the second cycle, which is designed as 3-year cycle. The time span was reduced to 3 years in order to have a complete picture of the dietary intake situation after a shorter period of time. The choice of commodities includes 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

---

[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 will be repealed by Commission Directive 2002/63/EC.
[9] Official Journal No L 11, 16/01/2001 p. 0040 - 0045
[10] Official Journal No L 184, 12/07/1997 p. 0033 - 0049

under their national programme and under the EU co-ordinated programme. A format for the reports on the Community programme was agreed (document SANCO/4811/2001). The Commission is required to compile and collate this 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 LEVELS (MRL), ACCEPTABLE DAILY INTAKES (ADI) AND ACUTE REFERENCE DOSES (ACUTE RFD)

Pesticide residue levels in foodstuffs are regulated in order to:

- minimise the exposure of consumers to the harmful or unnecessary 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 of products treated with pesticides as long as they comply with the MRLs fixed.

A maximum residue level (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. Food 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 ADIs and/or acute RfDs 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 (usually 100) 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 2001

Summary

The 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 - 145 different pesticides. Analysis is usually performed by multi-methods capable of detecting up to 100 or more pesticides. This means that at least an estimated 4.6 million individual determinations were carried out. 60 % of the samples contained no detectable pesticide residues. Detectable residues at or below the MRL were found in 37 % of the samples. In 3.6 % of the samples, the residues exceeded MRLs (both national or EC-MRLs). It was confirmed[12] that EC-MRLs were exceeded in 3.0 % of all samples[13].

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

Several factors can cause these differences in the monitoring programmes:

- The choice of pesticides investigated
- Sampling, e.g. more random or more targeted; the proportion of domestic and imported foodstuffs; the choice of crops
- 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 uncertainties)
- Differences in national MRLs, leading to differences in exceeded levels reported.

Table 1A and 1B give a general overview of surveillance and follow-up enforcement sampling and the numbers of samples taken for fresh (incl. frozen)[14] and processed products, respectively.

---

[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.

[13] This paragraph relates to the total number of samples (sum of fresh (incl. frozen) and processed products).

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

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). Tables 3 and 4 relate to surveillance sampling only - for fruit and vegetables and for cereals, respectively. Table 5 shows follow-up enforcement samples taken for fruit and vegetables only, since no follow-up enforcement samples were taken for cereals. Table 6 relates to processed products (surveillance sampling only, since no follow up enforcement samples were analysed). In Tables 2 and 3 the total sample numbers including processed products are given in the last row of the tables.

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/4811/2001) for reporting the results of the 2001 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 peppers or chlormequat in pears from countries where previously problems were found. Samples directed to a special producer or consignment, however, fall within the category 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 to a specific problem, but not to a specific producer/consignment fall within the category surveillance sampling.

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

Total number of samples analysed in EU and EEA	46149	
Surveillance samples	45810	99.3%
Follow-up enforcement samples	339	0.7%

Table 1A shows that 99.3 % of the samples were surveillance samples and 0.7 % were follow-up enforcement samples. The number of follow-up enforcement samples in 2001 was considerably lower than in 2000 (2,582 in 2000, representing 5.7 % of the total).

As Tables 3 and 5 for fruit and vegetables show, the more targeted nature of the follow-up enforcement sampling leads to both a higher percentage of pesticide findings at or below MRL (52 % of samples compared to 38 % in the surveillance sampling) and of MRL

exceedances (17 % compared to 3.9 % in the surveillance sampling). Consequently, the percentage of samples without residues is lower for follow-up enforcement samples (31 % compared to 58 % for surveillance samples).

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

For cereals, 2337 samples were analysed (Table 4), compared to 40,375 samples for fruit and vegetables (Table 3). Fewer pesticides (81) were analysed in cereals than in fruit and vegetables (145) and the percentage of pesticides found as share of those sought was lower (7.2 %, compared to 44 % for fruit and vegetables). Details of the pesticides most often found in both product groups are given in Table 8 (page 18/19).

The percentage of samples without residues was considerably higher in cereals (81 %) than in fresh fruit and vegetables (58 %). Consequently the percentage of samples with residues at or below the MRL and exceeding the MRL was lower in cereals - 27 % and 1.0 %, respectively - compared to 38 % and 3.9 %, respectively, in fruit and vegetables.

Fresh versus processed products

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

Total number of samples analysed in EU and EEA	46149	
Fresh fruit and vegetables	40714	88%
Cereals	2337	5%
Processed products	3098	7%

As indicated in Table 1B, 93 % of the samples taken in the EU and the EEA States were fresh (incl. frozen) fruit, vegetables and cereals. 7 % of the samples were processed products.

Out of 18 countries, 11 took samples of processed products (fruit and vegetables), and about a third of these were taken by the UK (36 %) (Table 6, page 14).

Comparing processed products of fruit and vegetables (Table 6) with fresh products (Table 3)[15] 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 29 % of the samples, compared to 38 % in fresh products; residues exceeding the MRL were found in 0.3 % of the samples (from two countries), compared to 3.9 % in fresh products. As a consequence, the percentage of samples without residues is significantly higher in processed products (71 % compared to 58 % in fresh products). The low rate of MRL exceedances in processed products

[15] In both tables surveillance sampling only

is due to the fact that no specific harmonised EC-MRLs for processed products have yet been set at the EU level. However, 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 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 (3,098 samples) compared to fresh products (40,375 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[16] for pesticide residues on **fresh (incl. frozen) fruit, vegetables and cereals, sum of surveillance and follow up 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 resi-dues**	**%**	**No. of samples with residues below or at MRL (nationa l or EC MRLs)**	**%**	**No. of samples with residues above MRL (national or EC MRLs)**	**%**	**No. of samples with confir-med residues above EC-MRLs**	**%**
B	927	150	43	29	479	52	411	44	37	4.0	29	3.1
DK	3250	130	90	69	1978	61	1131	35	141	4.3	136	4.2
D	6340	90	55	61	3442	54	2675	42	223	3.5	216	3.4
EL	1374	207	42	20	931	68	394	29	49	3.6	46	3.3
E	3341	175	79	45	2050	61	1152	34	139	4.2	133	4.0
F	4108	223	99	44	2081	51	1777	43	250	6.1	172	4.2
IRL	331	75	36	48	181	55	140	42	10	3.0	10	3.0
I	9365	n/a	n/a	n/a	6460	69	2782	30	123	1.3	123	1.3
L	167	52	29	56	105	63	52	31	10	6.0	7	4.2
NL	2879	314	122	39	1193	41	1423	49	263	9.1	128	4.4
A	962	149	74	50	540	56	352	37	70	7.3	55	5.7
P	496	116	45	39	297	60	170	34	29	5.8	24	4.8
FIN	2164	173	89	51	1130	52	909	42	125	5.8	101	4.7
S	2493	218	100	46	1438	58	987	40	68	2.7	57	2.3
UK	2017	182	88	48	1248	62	742	37	27	1.3	27	1.3
Norway	2466	145	64	44	1578	64	797	32	91	3.7	90	3.6
Iceland	308	40	24	60	187	61	107	35	14	4.5	14	4.5
Liech-tenstein	63	32	7	22	46	73	15	24	2	3.2	2	3.2
Total	**43051**	**145 (Average)**	**64 (Average)**	**44**	**25364**	**59**	**16016**	**37**	**1671**	**3.9**	**1370**	**3.2**
Total *incl. proces-sed products*	**46149**	**145 (Average)**	**64 (Average)**	**44**	**27560**	**60**	**16909**	**37**	**1680**	**3.6**	**1373**	**3.0**

n/a: not available

[16] See the explanation about the differences in monitoring results by country under chapter 4.1, p. 6

Table 3: Results of the eighteen national monitoring programmes for pesticide residues on **fresh (incl. frozen) fruit and 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 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 confir-med residues above EC-MRLs**	**%**
B	892	150	43	29	474	53	381	43	37	4.1	29	3.3
DK	3039	130	90	69	1787	59	1112	37	140	4.6	135	4.4
D	6023	90	55	61	3228	54	2576	43	219	3.6	212	3.5
EL	1369	207	42	20	926	68	394	29	49	3.6	46	3.4
E	3098	175	79	45	1827	59	1134	37	137	4.4	131	4.2
F	3645	223	99	44	1879	52	1540	42	226	6.2	153	4.2
IRL	296	75	36	48	148	50	138	47	10	3.4	10	3.4
I	8857	n/a	n/a	n/a	6038	68	2706	31	113	1.3	113	1.3
L	157	52	29	56	95	61	52	33	10	6.4	7	4.5
NL	2657	314	122	39	1122	42	1277	48	258	9.7	126	4.7
A	962	149	74	50	540	56	352	37	70	7.3	55	5.7
P	431	116	45	39	245	57	158	37	28	6.5	23	5.3
FIN	2097	173	89	51	1095	52	879	42	123	5.9	99	4.7
S	2204	213	97	46	1204	55	944	43	56	2.5	48	2.2
UK	1963	182	88	48	1241	63	695	35	27	1.4	27	1.4
Norway	2326	145	64	44	1507	65	742	32	77	3.3	76	3.3
Iceland	300	40	24	60	187	62	105	35	8	2.7	8	2.7
Liechten-stein	59	32	7	22	42	71	15	25	2	3.4	2	3.4
Total	**40375**	**145 (Average)**	**64 (Average)**	**44**	**23585**	**58**	**15200**	**38**	**1590**	**3.9**	**1300**	**3.2**
Total *incl. processed products*	**43473**	**145 (Average)**	**64 (Average)**	**44**	**25781**	**59**	**16093**	**37**	**1599**	**3.7**	**1303**	**3.0**

n/a: not available

Table 4: Results of the eighteen national monitoring programmes for pesticide residues on **cereals, surveillance sampling only.** (No follow up enforcement samples or processed products on cereal basis were analysed).

	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 confir-med residues above EC-MRLs**	**%**
B	35	11	4	36	5	14	30	86	0	0	0	0
DK	211	80	10	13	191	91	19	9.0	1	0.5	1	0.5
D	298	71	19	27	201	67	93	31	4	1.3	4	1.3
EL	5	3	0	0	5	100	0	0	0	0	0	0
E	243	80	8	10	223	92	18	7.4	2	0.8	2	0.8
F	271	136	7	5.1	149	55	120	44	2	0.7	2	0.7
IRL	30	75	1	1.3	29	97	1	3.3	0	0	0	0
I	508	n/a	n/a	n/a	422	83	76	15	10	2.0	10	2.0
L	10	52	0	0	10	100	0	0	0	0	0	0
NL	204	315	12	3.8	69	34	135	66	0	0	0	0
A	0	0	0	0	0	0	0	0	0	0	0	0
P	62	96	5	5.2	49	79	12	19	1	1.6	1	1.6
FIN	67	159	5	3.1	35	52	30	45	2	3.0	2	3.0
S	237	46	7	15	215	91	21	8.9	1	0.4	1	0.4
UK	47	21	4	19	7	15	40	85	0	0	0	0
Norway	105	42	6	14	61	58	44	42	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0
Liech-ten-stein	4	32	0	0	4	100	0	0	0	0	0	0
Total	**2337**	**81 (Average)**	**6 (Average)**	**7.2**	**1675**	**72**	**639**	**27**	**23**	**1.0**	**23**	**1.0**

n/a: not available

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 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 confir-med 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	19	13	68	6	32	0	0	0	0
EL	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0
F	192	53	28	117	61	22	11	17	8.9
IRL	5	4	80	1	20	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	18	2	11	11	61	5	28	2	11
A	0	0	0	0	0	0	0	0	0
P	3	3	100	0	0	0	0	0	0
FIN	0	0	0	0	0	0	0	0	0
S	52	19	37	22	42	11	21	8	15
UK	7	0	0	7	100	0	0	0	0
Nor-way	35	10	29	11	31	14	40	14	40
Iceland	8	0	0	2	25	6	75	6	75
Liech-ten-stein	0	0	0	0	0	0	0	0	0
Total	**339**	**104**	**31**	**177**	**52**	**58**	**17**	**47**	**14**

Table 6: Results of eleven 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 confir-med residues above EC-MRLs**	**%**
B	102	93	91	8	7.8	1	1.0	1	1.0
DK	231	223	97	8	3.5	0	0	0	0
D*	0	0	0	0	0	0	0	0	0
EL	365	110	30	249	68	6	1.6	0	0
E*	0	0	0	0	0	0	0	0	0
F	261	57	22	204	78	0	0	0	0
IRL*	0	0	0	0	0	0	0	0	0
I*	0	0	0	0	0	0	0	0	0
L	4	4	100	0	0	0	0	0	0
NL	17	16	94	1	5.9	0	0	0	0
A*	0	0	0	0	0	0	0	0	0
P	108	88	81	20	19	0	0	0	0
FIN	275	218	79	55	20	2	0.7	2	0.7
S	456	410	90	46	10	0	0	0	0
UK	1127**	834	74	293	26	0	0	0	0
Nor-way	152	143	94	9	5.9	0	0	0	0
Ice-land*	0	0	0	0	0	0	0	0	0
Liech-ten-stein*	0	0	0	0	0	0	0	0	0
Total	3098	2196	71	893	29	9	0.3	3	0.1

* no processed products were analysed

** This figure includes 96 tea samples.

4.2. Results of the 2001 national monitoring programmes compared to the previous years

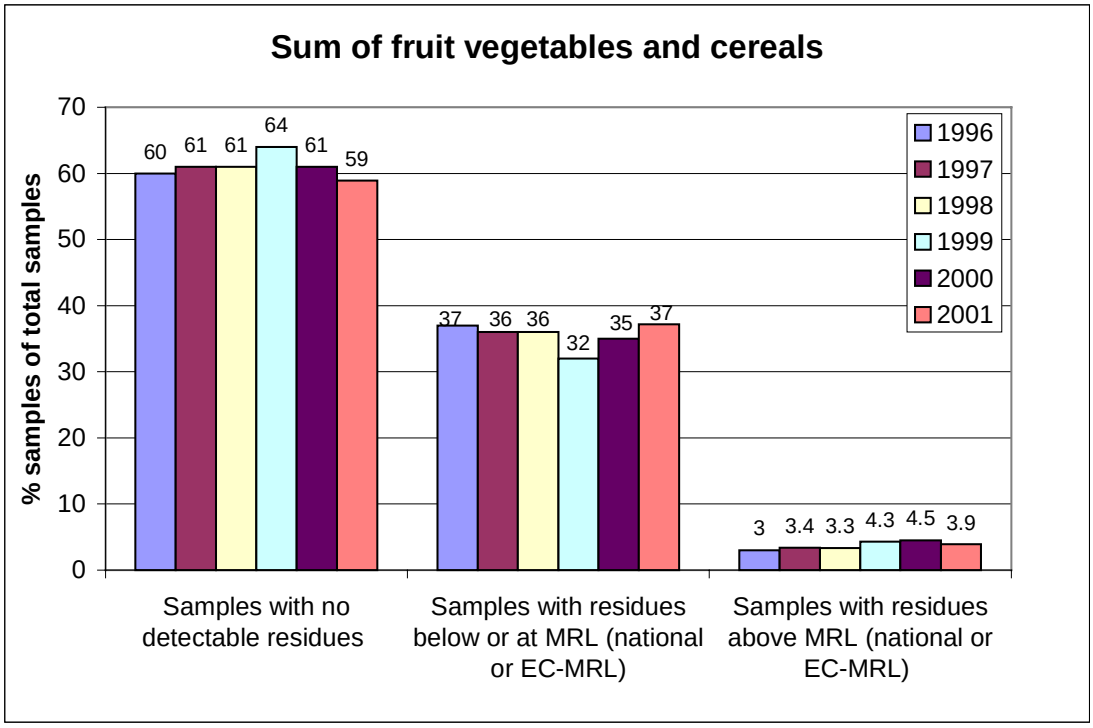

Figure 1: National monitoring results 1996 - 2001 for fruit, vegetables and cereals (sum of surveillance and follow-up enforcement sampling, fresh (incl. frozen) products only) collected in 18 participating countries

Figure 1 gives an overview of the residue situation of 2001 compared to previous years. Only the results for fresh (incl. frozen) fruit, vegetables and cereals are shown, since only these were reported in all previous years. The chart shows that there is no clear trend in the occurrence of residues over the last 6 years. The percentage of samples with no detectable residues has slightly decreased compared to previous years, whereas the percentage of samples with residues at or below MRL has increased compared to the years 1999 and 2000, bringing the levels back to that found during 1996 - 1998. The percentage of exceedances has decreased compared with data of the last two years, but is higher than that found during 1996 - 1998.

The fact that the data vary from year to year is not necessarily due to a real change in the residue situation. As outlined previously 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 the national level and are often targeted to specific problems. Other factors which contribute to this variation include changes in the legislative situation, e.g. changes of MRLs, as well as the constantly improving quality of the analytical laboratories, which are able to detect and quantify lower amounts and a higher number of different pesticides. Furthermore, comparability of the 1996 - 2001 data is somewhat limited, since the number of countries included in the reports was not the same during all the six years.

4.3. Samples with multiple residues

Table 7 summarises samples in which more than one pesticide residue was found. Residues of more than one pesticide were found in about 18 % of the analysed samples. As the Italian data provided only the sum of samples with multiple residues, not broken down by category, no conclusion can be drawn with regard to the results for the different categories.

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	927	80	29	17	6	1	0	0	133	14.3
DK	3250	356	150	72	34	12	4	1	629	19.4
D	6340	662	347	117	47	20	11	2	1206	19.0
EL	1374	96	15	9	3	0	0	0	123	9.0
E	3341	194	104	46	10	3	0	0	357	10.7
F	4108	600	323	140	88	22	12	5	1190	29.0
IRL	331	40	21	2	3	0	0	0	66	19.9
I *	9365	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1067	11.4
L	167	15	4	2	0	0	0	0	21	12.6
NL	2879	418	268	145	55	29	16	8	939	32.6
A	962	99	43	21	4	4	4	3	178	18.5
P	496	50	16	4	2	0	0	0	72	14.5
FIN	2164	236	118	46	18	2	2	1	423	19.5
S	2493	237	141	56	22	4	1	0	461	18.5
UK	2017	252	130	32	21	10	2	1	448	22.2
Norway	2466	248	94	27	12	3	4	0	388	15.7
Iceland	308	29	12	13	6	2	1	0	63	20.5
Liechtenstein	63	2	0	0	0	0	0	0	2	3.2
Total	**43051**	**(3614)**	**(1815)**	**(749)**	**(331)**	**(112)**	**(57)**	**(21)**	**7766**	
%		**(8.4)***	**(4.2)***	**(1.7)***	**(0.77)***	**(0.26)***	**(0.13)***	**(0.049)***	**18.0**	

* Only the total number of samples with multiple residues was provided for Italy, therefore the results for each category do not include Italy and the sample numbers do not add up to the total of 7,766.

Samples with multiple residues in the years 1996 - 2001

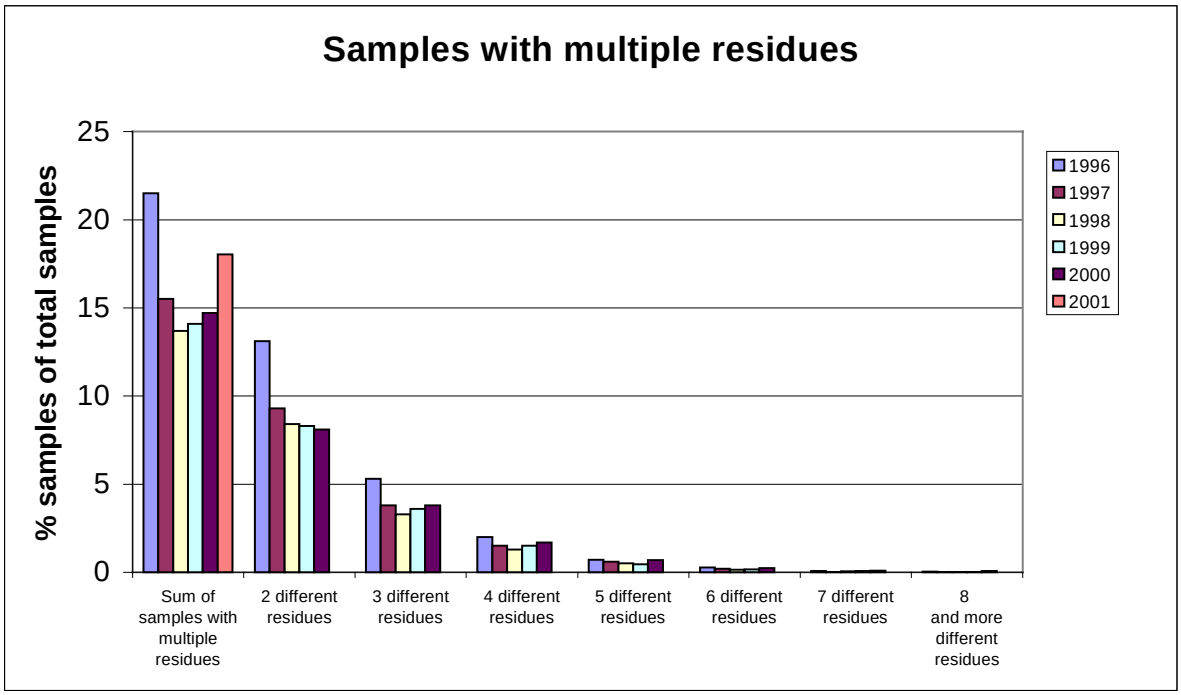

Figure 2: Samples with multiple residues - Comparison of the years 1996 - 2001, fresh (incl. frozen) fruit, vegetables and cereals only, sum of surveillance and enforcement sampling

For Italy, only the total number of samples with multiple residues was provided.

Figure 2 gives an overview of the distribution of samples with multiple residues in the years 1996 to 2001. To facilitate comparison with previous years, only fresh fruit, vegetables and cereals have been shown.

In 2001, the percentage of samples containing multiple residues has significantly increased compared to the 4 previous years. Only the 1996 data showed higher levels, but the 1996 data should be treated with caution, since only 11 countries delivered data[17].

Since Italy did not provide data for the different categories (samples with 2, 3, etc. residues) only the sum of samples with multiple residues can be given for 2001 and no conclusion can be drawn on the distribution over the different categories.

[17] In 1997 and 1998 fifteen countries out of sixteen delivered data for this overview, in 1999 sixteen countries out of seventeen and in 2000 and 2001 all eighteen countries delivered data.

4.4. Most frequently found pesticides

The pesticides that have been most frequently found in the national monitoring programmes are shown in Table 8. In 2001, a separation between the pesticides found in fruit and vegetables and in cereals was made, since the findings can be very different for both product groups. Member States, Norway, Iceland and Liechtenstein were asked to prepare a list of the ten most frequently found pesticides in decreasing order of frequency. The 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 received have been included 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, propamocarb, bromide, imazalil, prochloraz, chlorpropham, maneb group, iprodione, thiabendazol, and benomyl group	Bromide, dichlorvos, malathion and pirimiphos-methyl
DK	Chlormequat, imazalil, chlorpyriphos, maneb group, endosulfan, procymidone, malathion, iprodione, methidathion and ortho-phenylphenol	Chlormequat, glyphosate, pirimiphos-methyl, deltamethrin, malathion, chlorpyriphos, fenitrothion, chlorpyriphos-methyl, methoxychlor and permethrin
D	Chlormequat, maneb group, benomyl group, brompropylate, chlorpyriphos, procymidone, captan/folpet (sum), iprodione, endosulfan and thiabendazol	Bromide, pirimiphos-methyl, chlormequat, chlorothalonil, thiabendazol, malathion, dichlorvos, carbosulfan, imazalil and HCH (sum of α and β)
EL	Maneb group, benomyl group, chlorpyriphos, phosalone, endosulfan, myclobutanil, bifenthrin, bromopropylate, procymidone and tetradifon	None found
E	Chlorpyriphos, procymidone, maneb group, imazalil, dicofol, methidathion, endosulfan, dimethoate, malathion and captan	Malathion, chlorfenvinphos, pirimiphos-methyl, diazinon, bromopropylate, tetradifon and thiabendazol
F	Maleic-hydrazide, thiabendazol, benomyl group, maneb group, iprodione, imazalil, oxadixyl, procymidone, bromide and chlorpyriphos	Pirimiphos-methyl, malathion, deltamethrine, chlorpyriphos-methyl, dichlorvos, chlorpyriphos and γ HCH
IRL	Thiabendazol, benomyl group, captan, chlorpyriphos, iprodione, dimethoate, dicofol, vinclozolin, chlorothalonil and chlorfenvinphos	Pirimiphos-methyl

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**
I	No data provided.	
L	Pyrimethanil, iprodione, procymidone, folpet, metalaxyl, captan, tolclofos-methyl, tolylfluanid, phosalone and methidathion	None found
NL	Chlormequat, imidacloprid, benomyl group, imazalil, maneb group, thiabendazol, iprodione, captan, tolylfluanid, and chlorpyriphos	Chlormequat, trinexapac-ethyl, bromide, pirimiphos-methyl, chlorpyriphos-methyl, dichlorvos, malathion, maneb group, piperonyl-butoxide and benomyl group
A	Imazalil, procymidone, endosulfan, iprodione, chlorpyriphos, dimethoate, thiabendazol, methidathion, metalaxyl and toloclofos-methyl	No data provided.
P	Maneb group, benomyl group, captan, phosalone, phosmet, procymidone, dimethoate, iprodione, diphenylamine and chlorpyriphos	Malathion, pirimiphos-methyl, chlorpyriphos-methyl, diazinon and dichlorvos
FIN	Maleic-hydrazide, dithianon, hydrogen phosphide, bromide, chlormequat, diquat, maneb group, thiabendazol, imazalil and endosulfan	Chlormequat, hydrogen phosphide, bromide, pirimiphos-methyl and malathion
S	Chlormequat, bromide, diquat, imazalil, maneb group, thiabendazol, maleic-hydrazide, ethoxyquin, fenbutatinoxide and cyhexatine	Bromide, glyphosate, hydrogen phosphide, chlorpyriphos-methyl, deltamethrin, pirimiphos-methyl, and dichlorvos
UK	2,4-D, chlormequat, ortho-phenylphenol, fenhexamid, glyphosate, chlorpropham, bromide, imazalil, dodine and DDT	Chlormequat, glyphosate, pirimiphos-methyl and etrimfos
Norway	Chlormequat, ortho-phenylphenol, maneb group, iprodione, imazalil, thiabendazol benomyl group, propargite, cyprodinil and tolylfluanid	Chlormequat, glyphosate, pirimiphos-methyl, AMPA, malathion and deltamethrin
Iceland	Imazalil, thiabendazol, ortho-phenylphenol, chlorpyriphos, dicofol, methidathion, tolylfluanid, chlorothalonil, iprodione and procymidone	No data provided.
Liechtenstein	Folpet, azinphosmethyl, maneb group, benomyl group, dimethoate, thiabendazol and diazinon	None found.
EU, NOR, ICE and LIE	Maneb group, chlormequat, imazalil, benomyl group, thiabendazol, chlorpyriphos, iprodione, procymidone, bromide and endosulfan	Pirimiphos-methyl, malathion, chlormequat, bromide, glyphosate, dichlorvos, chlorpyriphos-methyl, deltamethrin, hydrogen phosphide and diazinon

The table shows that the most frequently found pesticides on fruit and vegetables were mainly fungicides, as in previous years. On cereals, the pesticides found were mainly insecticides. In

the year 2001, the 10 most frequently found pesticides were almost identical to the ones found in 2000, and the majority was identical to those found in previous years.

In 2000, the reporting procedure changed. In 1996 - 1999 the *absolute* number of findings was reported whereas, from 2000 onwards, the *relative* frequency of pesticides' occurrences were reported. This situation limits the comparability of the data collected during 1996 - 1999 with those collected in 2000 and 2001.

5. THE EU CO-ORDINATED MONITORING EXERCISE

As an EU co-ordinated monitoring exercise, the Commission recommended in 2001 via Commission Recommendation 2001/42/EC that five commodities should be tested (apples, tomatoes, lettuce, strawberries and table grapes) for 36 pesticides (acephate, azinphos-methyl, azoxystrobin, benomyl group[18], captan, chlorothalonil, chlorpyriphos, chlorpyriphos-methyl, deltamethrin, diazinon, dichlofluanid, dicofol, dimethoate, disulfotone, endosulfan, folpet, imazalil, iprodione, lambda-cyhalothrin, malathion, maneb group[19], mecarbam, metalaxyl, methamidophos, methidathion, omethoate, oxydemeton-methyl, permethrin, phorate, pirimiphos-methyl, procymidone, propyzamide, thiabendazole, triazophos, thiometon and vinclozolin). This list has been extended substantially compared to previous years and comprises the 20 pesticides analysed in 1998 to 2000 plus 16 additional ones. It also includes all the pesticides analysed in 1996 and 1997, apart from one[20].

All Member States and EEA States participated in the EU co-ordinated programme. Overall, around 9,868 samples were analysed (2,641 apple samples, 2,016 tomato samples, 1,838 lettuce samples, 1,652 strawberry samples and 1,721 grape samples). This is about twice the number of samples as in previous years. However, not all of the samples were analysed for all 36 pesticides.

5.1. Sampling design applied in the 2001 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 2001/42/EC, each Member State should take the minimum number of samples specified in the Annex (cf. Table 9).

The sampling design of the co-ordinated programme is based on a statistical method proposed by Codex Alimentarius[21]. 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

[18] The benomyl-group comprises three different compounds (benomyl, carbendazim, thiophanate-methyl), which are analysed with the same analytical method and determined as sum, expressed as carbendazim.

[19] The maneb group, by legal definition, comprises five different dithiocarbamates, which are determined as sum, expressed as CS_2.

[20] DDT was only analysed in 1997 and is not included in the list of the 36 pesticides.

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

plant origin will contain residues above this specific level. This level could be the reporting level[22] 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 between 12 and 93, resulting in a total of 460 samples for all Member States and 496 samples for all participating countries (incl. EEA States). This procedure was the same as in the exercises 1998 - 2000. In 2001, the recommended number of samples was taken in most cases and in many cases more samples were taken than recommended. However, Iceland and Liechtenstein did not take the required sample numbers for most of the commodities and Ireland took the required sample numbers only for 2 out of 5 commodities. Most samples were taken for apples, followed by tomatoes, lettuce, table grapes and strawberries. Table 9 shows the required number of samples by Member State compared to the number of samples actually taken.

[22] 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.

Table 9: Numbers of samples taken by Member State for each commodity

Country	Recommended number of samples (for each commodity)	Number of samples taken by commodity				
		Apples	Tomatoes	Lettuce	Strawberries	Table Grapes
B	12	44	39	76	23	33
DK	12	139	129	89	46	140
D	93	558	489	325	389	593
EL	12	55	77	45	47	81
E	45	45	45	45	45	35
F	66	308	272	379	141	61
IRL	12	40	10	37	5	4
I	65	525	318	149	235	144
L	12	21	15	20	17	14
NL	17	129	109	134	128	180
A	12	12	12	12	12	12
P	12	50	66	85	21	88
FIN	12	116	78	83	145	68
S	12	202	105	75	68	105
UK	66	252	144	180	179	72
Total EU	**460**	**2496**	**1908**	**1734**	**1501**	**1630**
Norway	12	115	86	93	141	72
Iceland	12	20	11	4	8	9
Liechtenstein	12	10	11	7	2	10
Total EU and EEA	**496**	**2641**	**2016**	**1838**	**1652**	**1721**

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 is estimated on a 95% confidence level for each of the 35 pesticides[23].

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. 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 is illustrated using the reported concentrations of the benomyl group in the food items. 5,433 samples have been analysed and 447 of them showed residues below or at the MRL. The number of 5,433 samples represents only a part of the whole European market, therefore the calculated fraction of samples with residues below or at the MRL (447/5433 = 8.23 %) 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 the above mentioned Figures. For the example of the benomyl group, this means that the true value of the number of samples with residues at or below the MRL would vary between 407 and 489 samples, which corresponds to a range of 7.5 to 9.0 %.

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 that could still contain residues above the MRL. For example, no sample with residues exceeding the MRL for disulfotone was found in the co-ordinated monitoring exercise, but the upper limit of the error range is 0.16 %, which means that still 0.16 % of the specific commodities in the whole population (European market) could have exceeding MRLs for disulfotone. This upper limit of the error range for the other pesticides for which no residues exceeding the MRL have been found (e.g. azinphosmethyl, mecarbam, oxymethon-methyl, permethrin), varied from 0.05 to 0.27 - depending on the number of samples included (ranging from 1430 to 8866 for the individual pesticides) - and was considered as very low. This ensures sufficient precision of the results and allows for subsequent risk analysis calculations to be carried out.

[23] 36 pesticides were analysed, but the results for captan and folpet were combined, because the MRL relates to the sum of captan and folpet.

Statistical evaluation of the results of the co-ordinated exercise:
Percentage of samples with residues at or below MRL (national or EC-MRL) or exceeding the MRL (national or EC-MRL) for a specific pesticide with the respective error bars in a logarithmic scale

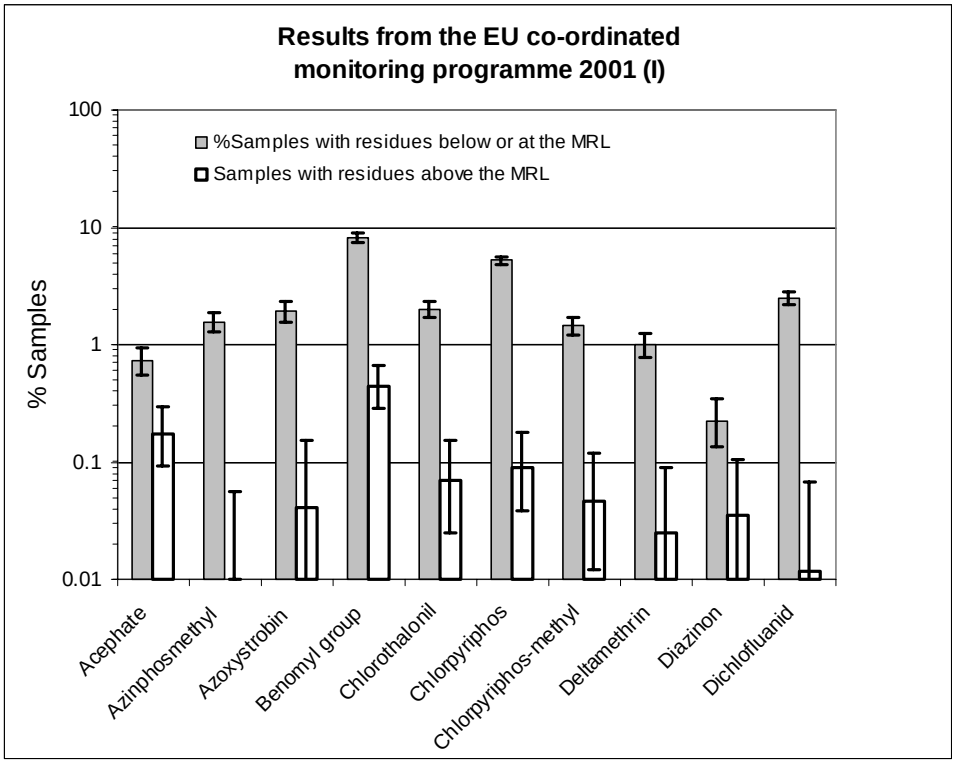

Figure 3: Results of the monitoring programme (I)

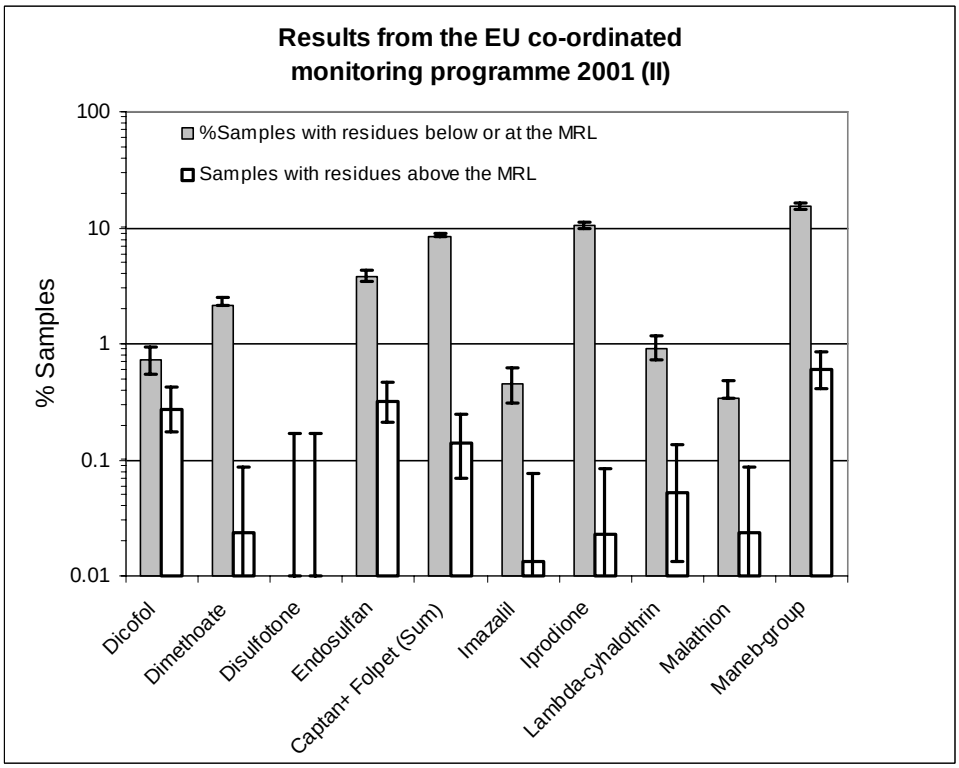

Figure 4:Results of the monitoring programme (II)

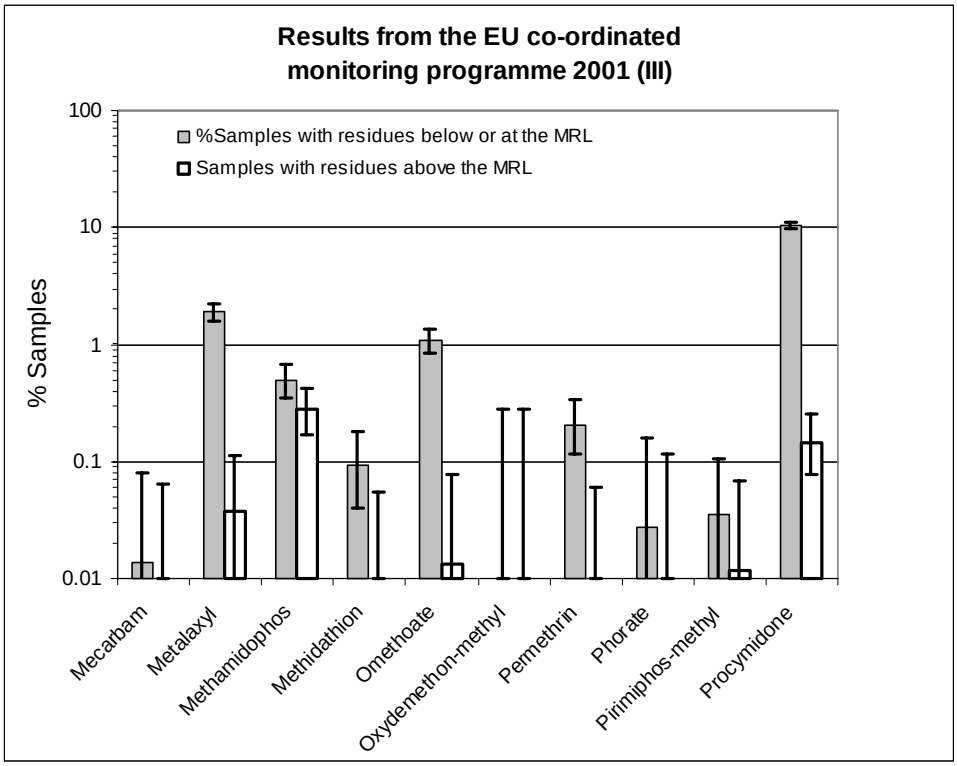

Figure 5:Results of the monitoring programme (III)

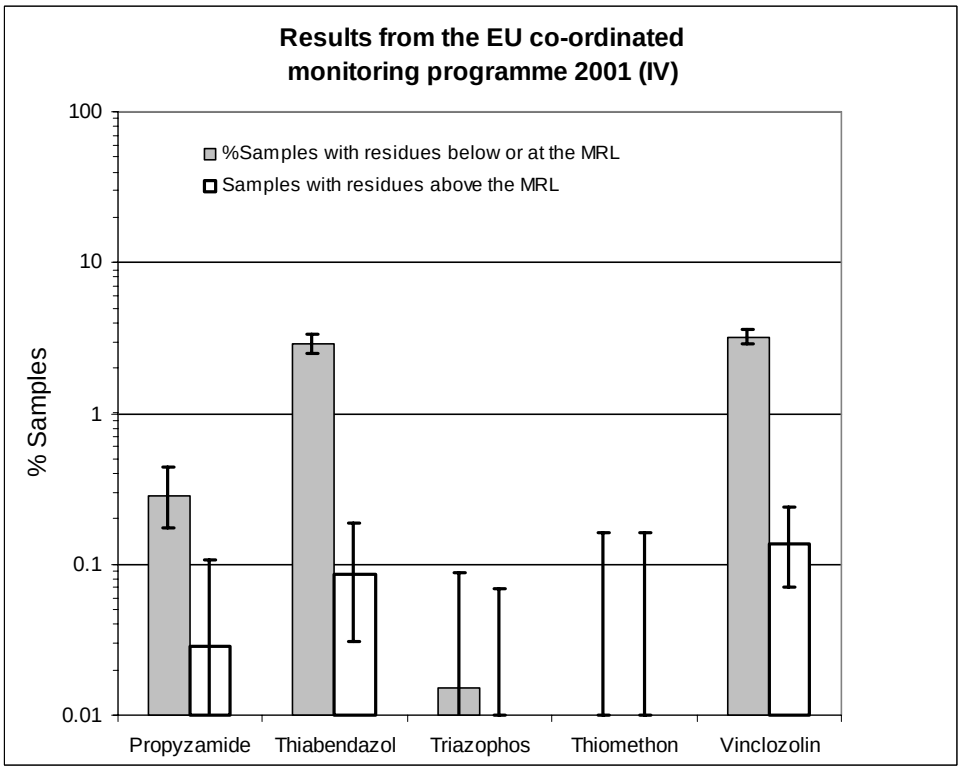

Figure 6:Results of the monitoring programme (IV)

5.2. Evaluation by pesticide

The summarised results are given in Table 10 for all 35 pesticides[24]. 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 combinations. More details can be found in Annex 2, where the complete results for all reporting countries and all commodities are given.

The results vary among the 35 different pesticides investigated. In the EU co-ordinated monitoring programmes, residues of the maneb group were found most often (16.0 %* of all samples), followed by iprodione (10.5 %*), procymidone (10.4 %*), benomyl group (8.7 %), captan/folpet (sum) (8.5 %), chlorpyriphos (5.3 %), endosulfan (4.2 %), vinclozolin (3.4 %), thiabendazol (3.0 %), dichlofluanid (2.5 %), dimethoate (2.2 %) and chlorothalonil (2.1 %). Seven further pesticides were found in amounts between 1 and 2 %, the remainder below 1 %. Disulfotone, oxydemeton-methyl and thiometon were not detected, but the number of samples analysed for these three pesticides was low (< 3,000) compared to the sample numbers analysed for the other pesticides (up to 9,000) and they were only analysed by 6-8 countries. Azoxystrobin, a relatively new fungicide for which MRLs have been set in recent years, was analysed by 13 countries (about 5,000 samples). It was detected at or below the MRL in 1.9 % of the samples and exceeded in 0.04 % of the samples.

The maneb group was found mainly in lettuce and table grapes, but also to a large extent in tomatoes and apples. About 24 %* of all lettuce and grape samples and about 11 %* of all tomato and apple samples contained residues of the maneb group.

Residues of iprodione were found most often in lettuce (22 %* of all lettuce samples), table grapes (17%*) and strawberries (12 %*). Residues of procymidone were found most often in grapes (18 %*), but also in tomatoes (13 %*), lettuce (12 %*) and strawberries (12 %*). Residues of the benomyl group and captan/folpet were found most often in apples (15 %* and 21 %* of all apple samples, respectively). More details about the occurrence of further pesticides in specific commodities are shown in Table 11.

Residues of the maneb group exceeded MRLs most often (0.61 % of all samples), followed by the benomyl group (0.44 %), endosulfan (0.32 %), dicofol and methamidophos (0.28 % each).

The MRL for the maneb group was exceeded most often in lettuce (2.5 % of all lettuce samples). The residues of the benomyl group exceeded the MRL most often on strawberries (2.2 % of all strawberry samples). Residues of endosulfan, dicofol and methamidophos exceeded the MRL most often on strawberries (0.69 %, 0.65 % and 0.54 %, respectively of all strawberry samples). Endosulfan was also exceeded on lettuce (0.58 % of all lettuce samples).

The maneb group was the pesticide both most often found and for which MRLs (national or EC-MRLs) was most often exceeded.

Figures 7 and 8 illustrate the findings with regard to the 35 different pesticides in decreasing order of percentages.

[24] 36 pesticides were analysed but the results for Captan + Folpet were combined, see footnote 23.

The highest residues found were 31 mg/kg maneb group, 29.9 mg/kg captan/folpet, 29 mg/kg iprodione, 14.8 mg/kg chlorothalonil, 13 mg/kg dichlofluanid, 14.8 mg/kg vinclozolin and 10.8 mg/kg procymidone, all of them on lettuce. This corresponds with the 1996 results, where the highest residues were also found mainly on lettuce.

* 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 apples, tomatoes, lettuce, strawberries and table grapes

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	7550	7482	55	0.73	13	0.17	3.58 (lettuce EC-MRL: 1)
Azinphosmethyl	8604	8470	134	1.56	0	0.00	0.97 (table grapes EC-MRL: 1)
Azoxystrobin	4852	4757	93	1.92	2	0.04	1.70 (lettuce EC-MRL: 0.05)
Benomyl group	5433	4962	447	8.23	24	0.44	3.65 (table grapes EC-MRL: 2.0)
Chlorothalonil	8586	8408	172	2.00	6	0.07	14.80 (lettuce EC-MRL: 0.01)
Chlorpyriphos	8789	8325	456	5.19	8	0.09	1.20 (table grapes EC-MRL: 0.50)
Chlorpyriphos-methyl	8743	8612	127	1.45	4	0.05	0.35 (table grapes EC-MRL: 0.20)
Deltamethrin	8167	8084	81	0.99	2	0.02	0.40 (table grapes EC-MRL: 0.10)
Diazinon	8575	8553	19	0.22	3	0.03	0.34 (strawberries EC-MRL: 0.5/0.02*)
Dichlofluanid	8464	8253	210	2.48	1	0.01	13.00 (lettuce EC-MRL: 10.00)
Dicofol	7971	7891	58	0.73	22	0.28	0.80 (apples EC-MRL: 1.0/0.02*)
Dimethoate	8556	8371	183	2.14	2	0.02	1.90 (lettuce EC-MRL: 1.0)
Disulfotone	2471	2471	0	0.00	0	0.00	Not detected.
Endosulfan	8478	8125	326	3.85	27	0.32	3.50 (lettuce EC-MRL: 1.0/0.05*)
Captan+ Folpet (Sum)	7965	7289	665	8.35	11	0.14	29.9 (lettuce EC-MRL: 2.00

* applicable from 1 July 2001

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)
Imazalil	7594	7559	34	0.45	1	0.01	0.92 (apples EC-MRL: 5.00
Iprodione	8626	7722	902	10.46	2	0.02	29.00 (lettuce EC-MRL: 10.00
Lambda-cyhalothrin	7713	7638	71	0.92	4	0.05	0.33 (table grapes EC-MRL: 0.20
Malathion	8611	8580	29	0.34	2	0.02	1.66 (strawberries EC-MRL: 0.50
Maneb-group	5274	4430	812	15.40	32	0.61	31.00 (lettuce EC-MRL: 5.00
Mecarbam	7308	7307	1	0.01	0	0.00	0.007 (table grapes EC-MRL: 0.05
Metalaxyl	7974	7821	150	1.88	3	0.04	2.56 (strawberries EC-MRL: 0.50
Methamidophos	7617	7558	38	0.50	21	0.28	1.12 (strawberries EC-MRL: 0.01
Methidathion	8684	8676	8	0.09	0	0.00	0.16 (table grapes EC-MRL: 0.50)
Omethoate	7500	7419	80	1.07	1	0.01	4.47 (lettuce EC-MRL: 0.20)
Oxydemethon-methyl	1430	1430	0	0.00	0	0.00	Not detected
Permethrin	7822	7806	16	0.20	0	0.00	0.5 (lettuce EC-MRL: 2.00
Phorate	3655	3654	1	0.03	0	0.00	0.03 (lettuce EC-MRL: 0.05*)
Pirimiphos-methyl	8495	8491	3	0.04	1	0.01	0.18 (table grapes EC-MRL: 0.05*)
Procymidone	8866	7940	913	10.30	13	0.15	10.80 (lettuce EC-MRL: 5.00)
Propyzamide	6960	6938	20	0.29	2	0.03	2.50 (lettuce EC-MRL: 1.00*)
Thiabendazol	7009	6799	204	2.91	6	0.09	3.00 (apples EC-MRL: 5.00)
Triazophos	6590	6589	1	0.02	0	0.00	0.021 (apples EC-MRL: 0.02*)
Thiomethon	2599	2599	0	0.00	0	0.00	Not detected
Vinclozolin	8828	8531	285	3.23	12	0.14	14.8 (lettuce EC-MRL: 5.00)

* applicable from 1 July 2001

Results of the 2001 co-ordinated exercise by pesticide:

Fig. 7: Percentage of samples at or below MRL (national or EC) and
Fig. 8: Percentage of samples exceeding the MRL (national or EC)

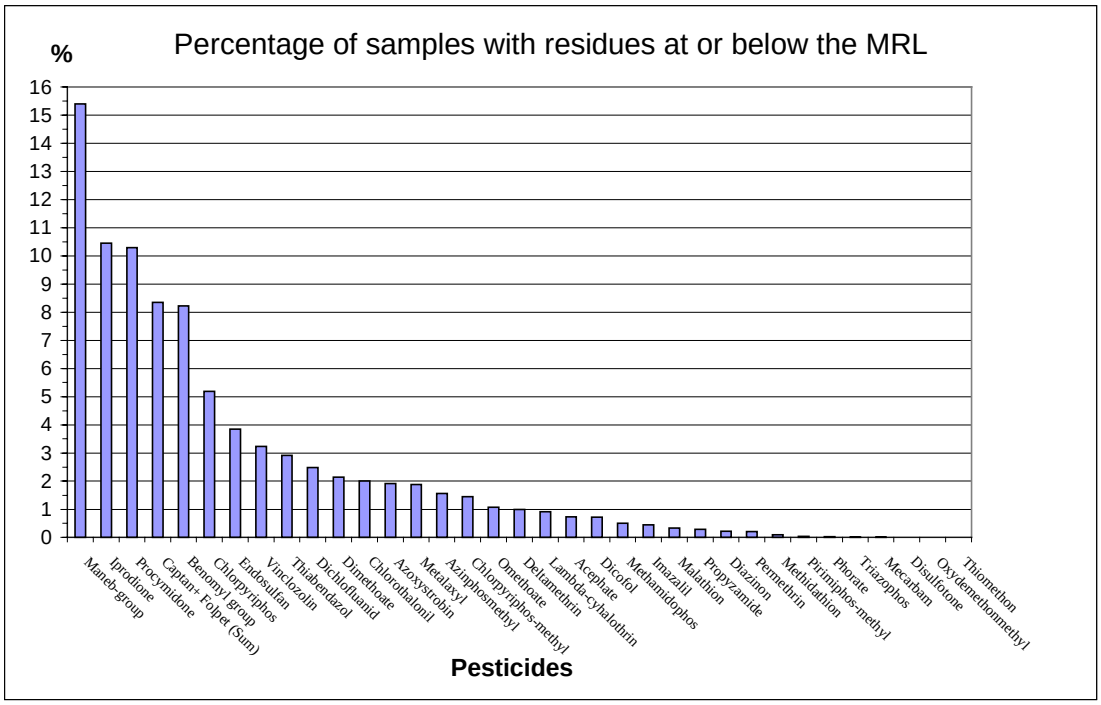

Figure 7: Samples with residues at or below MRL (national or EC-MRL)

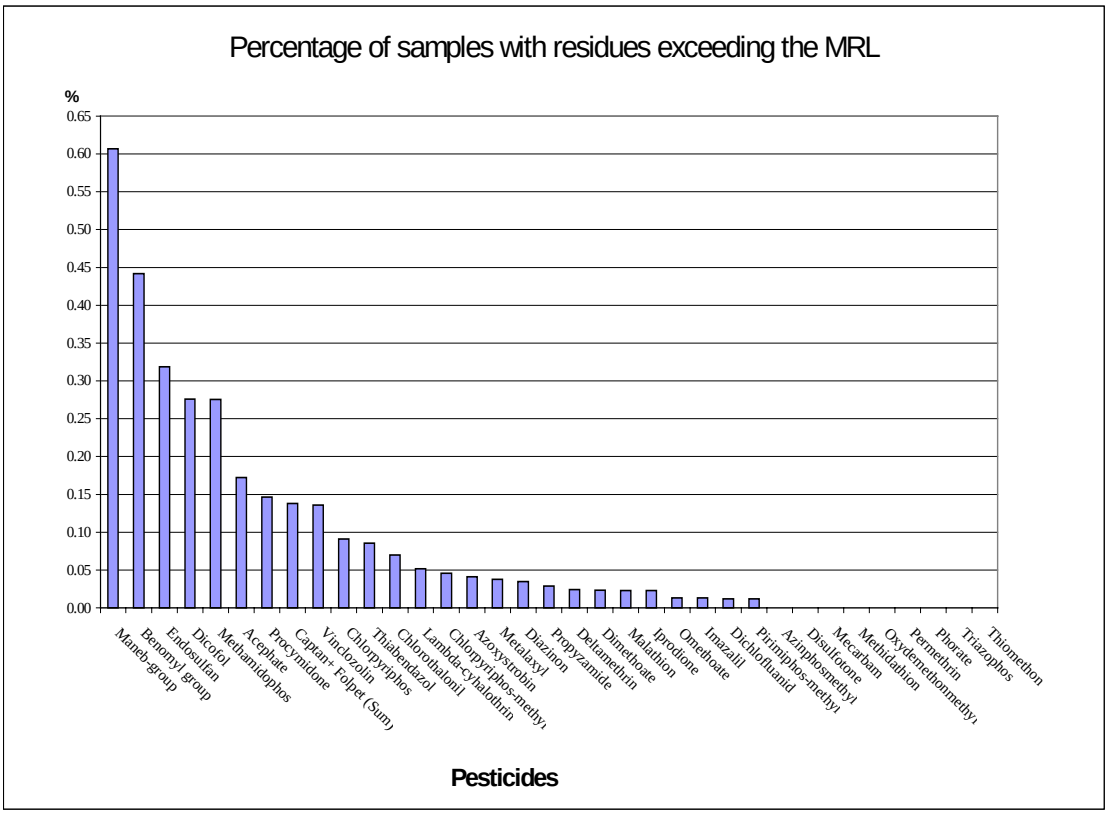

Figure 8: Samples with residues exceeding the MRL (national or EC-MRL)

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

Pesticides	**Detected most often in**[25]	**MRL exceeded most often in**
Acephate	**Lettuce** (3.07% of all lettuce samples; equal to 0.56% of all samples)	**Tomatoes** (0.32% of all tomato samples; equal to 0.07% of all samples)
Azinphosmethyl	**Apples** (5.47% of all apple samples, equal to 1.45% of all samples)	No exceedances.
Azoxystrobin	**Table grapes** (7.70% of all table grape samples; equal to 1.69% of all samples)	**Lettuce** (0.23% of all lettuce samples; equal to 0.04% of all samples)
Benomyl group	**Apples** (15.26% of all apple samples; equal to 4.33% of all samples) **Table grapes** (8.42% of all table grape samples; equal to 1.62% of all samples)	**Strawberries** (2.20% of all strawberry samples; equal to 0.31% of all samples)
Chlorothalonil	**Tomatoes** (6.50% of all tomato samples; equal to 1.34% of all samples)	**Lettuce** (0.38% of all lettuce samples; equal to 0.07% of all samples)
Chlorpyriphos	**Apples** (10.94% of all apple samples; equal to 2.84% of all samples) **Table grapes** (11.03% of all table grape samples; equal to 2.00% of all samples)	**Table grapes** (0.31% of all table grape samples; equal to 0.06% of all samples)
Chlorpyriphos-methyl	**Table grapes** (4.00% of all table grape samples; equal to 0.73% of all samples)	**Table grapes** (0.13% of all table grape samples; equal to 0.02% of all samples)
Deltamethrin	**Lettuce** (3.78% of all lettuce samples; equal to 0.70% of all samples)	**Table grapes** (0.13% of all table grape samples; equal to 0.02% of all samples)
Diazinon	**Apples** (0.59% of all apple samples; equal to 0.15% of all samples)	**Table grapes** (0.13% of all table grape samples; equal to 0.02% of all samples)
Dichlofluanid	**Strawberries** (6.08% of all strawberry samples; equal to 1.03% of all samples)	**Lettuce** (0.06% of all lettuce samples; equal to 0.01% of all samples)

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

Pesticides	Detected most often in[25]	MRL exceeded most often in
Dicofol	**Table grapes** (1.48% of all table grape samples; equal to 0.28% of all samples)	**Strawberries** (0.65% of all strawberry samples; equal to 0.11% of all samples)
Dimethoate	**Table grapes** (4.87% of all table grape samples; equal to 0.86% of all samples)	**Lettuce** (0.13% of all lettuce samples; equal to 0.02% of all samples)
Disulfotone	Not detected.	
Endosulfan	**Tomatoes** (9.29% of all tomato samples; equal to 1.88% of all samples)	**Strawberries** (0.69% of all strawberry samples; equal to 0.12% of all samples)
Captan+ Folpet (Sum)	**Apples** (20.66% of all apple samples; equal to 5.47% of all samples) **Table grapes** (8.79% of all table grape samples; equal to 1.64% of al samples)	**Lettuce** (0.42% of all lettuce samples; equal to 0.08% of all samples)
Imazalil	**Apples** (1.10% of all apple samples; equal to 0.30% of all samples)	**Table grapes** (0.07% of table grape samples; equal to 0.01% of all samples)
Iprodione	**Lettuce** (21.77% of all lettuce samples; equal to 4.19% of all samples) **Table grapes** (16.60% of all table grape samples; equal to 3.01% of all samples) **Strawberries** (12.00% of all strawberry samples; equal to 2.10% of all samples)	**Lettuce** (0.12% of all lettuce samples; equal to 0.02% of all samples)
Lambda-cyhalothrin	**Table grapes** (1.99% of all table grape samples; equal to 0.38% of all samples)	**Table grapes** (0.14% of table grape samples; equal to 0.03% of all samples)
Malathion	**Strawberries** (1.60% of all strawberry samples; equal to 0.28% of all samples)	**Strawberries** (0.13% of all strawberry samples; equal to 0.02% of all samples)

Pesticides	Detected most often in[25]	MRL exceeded most often in
Maneb-group	**Lettuce** (24.63% of all lettuce samples; equal to 5.35% of all samples) **Table grapes** (24.27% of all table grape samples; equal to 4.85% of all samples) **Tomatoes** (11.75% of all tomato samples; equal to 2.75% of all samples) **Apples** (11.40% of all apple samples; equal to 2.31% of all samples)	**Lettuce** (2.45% of all lettuce samples; equal to 0.53% of all samples)
Mecarbam	Only 1 detection.	No exceedances
Metalaxyl	**Lettuce** (4.43% of all lettuce samples; equal to 0.82% of all samples)	**Strawberries** (0.14% of all strawberry samples; equal to 0.03% of all samples)
Methamidophos	**Lettuce** (2.18% of all lettuce samples; equal to 0.39% of all samples)	**Strawberries** (0.54% of all strawberry samples; equal to 0.09% of all samples)
Methidathion	Only 8 detections; 5 on apples	No exceedances
Omethoate	**Table grapes** (3.01% of all table grape samples; equal to 0.57% of all samples)	**Lettuce** (0.07% of all lettuce samples; equal to 0.01% of all samples)
Oxydemethonmeth	Not detected	
Permethrin	**Lettuce** (0.55% of all lettuce samples; equal to 0.10% of all samples)	No exceedances
Phorate	Only 1 detection, on lettuce	No exceedances
Pirimiphos-methyl	Only 4 detections; 2 on table grapes	1 exceedance, on table grapes

Pesticides	Detected most often in[25]	MRL exceeded most often in
Procymidone	**Table grapes** (17.63% of all table grape samples; equal to 3.18% of all samples) **Tomatoes** (12.91% of all tomato samples; equal to 2.63% of all samples) **Lettuce** (11.98% of all lettuce samples; equal to 2.27% of all samples) **Strawberries** (12.27% of all strawberry samples; equal to 2.13% of all samples)	**Apples** (0.49% of all apple samples; equal to 0.12% of all samples)
Propyzamide	**Lettuce** (1.52% of all lettuce samples; equal to 0.30% of all samples)	**Lettuce** (0.07% of all lettuce samples; equal to 0.01% of all samples) **Table grapes** (0.07% of all table grape samples; equal to 0.01% of all samples)
Thiabendazol	**Apples** (9.47% of all apple samples; equal to 2.57% of all samples)	**Strawberries** (0.34% of all strawberry samples; equal to 0.06% of all samples)
Triazophos	Only 1 detection, on apples	No exceedances
Thiomethon	No detections	
Vinclozolin	**Lettuce** (8.63% of all lettuce samples; equal to 1.59% of all samples)	**Tomatoes** (0.39% of all tomato samples; equal to 0.08% of all samples)

The most important pesticide-commodity combination where detectable residues were found (incl. those at or below the MRL and exceeding the MRL) was maneb group/lettuce, maneb group/table grapes, iprodione/lettuce and captan/folpet (sum)/apples.

With regard to MRL exceedances the most important pesticide-commodity combinations were maneb group/lettuce and benomyl group/strawberries.

Table 12: Comparative overview of the nine pesticides that were analysed in both 1996 and 2001 on the same five commodities.

	% of samples with residues AT OR BELOW the MRL									
	Apples		Tomatoes		Lettuce		Strawberries		Table Grapes	
	'96	'01	'96	'01	'96	'01	'96	'01	'96	'01
Acephate	1.40	0.36	0.48	0.52	2.99	2.85	0.00	0.00	0.29	0.07
Benomyl group	16.12	15.26	1.60	5.08	5.95	3.80	5.55	4.39	7.54	8.04
Chlorothalonil	0.13	0.45	4.35	6.50	0.71	0.19	1.95	2.82	0.07	0.25
Chlorpyriphos	6.13	10.94	0.10	1.11	0.26	0.19	0.49	0.81	6.88	10.71
Chlorpyriphos-methyl	1.81	1.78	0.15	0.28	0.13	0.06	1.03	1.28	0.39	3.88
Iprodione	1.41	1.66	1.67	3.82	27.37	21.65	14.82	12.00	16.42	16.60
Maneb-group	6.58	11.40	7.10	11.75	26.29	22.18	12.57	5.06	18.17	23.89
Methamidophos	0.04	0.05	1.30	0.51	1.67	2.03	0.10	0.08	0.08	0.00
Procymidone	0.59	0.45	9.11	12.91	7.97	11.92	17.58	12.27	16.85	17.56

	% of samples with residues ABOVE the MRL									
	Apples		Tomatoes		Lettuce		Strawberries		Table Grapes	
	'96	'01	'96	'01	'96	'01	'96	'01	'96	'01
Acephate	0.04	0.00	0.00	0.32	0.36	0.22	0.00	0.16	1.18	0.21
Benomyl group	0.21	0.00	0.13	0.25	1.70	0.00	2.50	2.20	2.09	0.38
Chlorothalonil	0.00	0.00	0.00	0.00	0.78	0.38	0.53	0.00	0.00	0.00
Chlorpyriphos	0.20	0.00	0.00	0.00	0.03	0.19	0.00	0.00	0.23	0.31
Chlorpyriphos-methyl	0.00	0.00	0.00	0.00	0.07	0.12	0.05	0.00	0.00	0.13
Iprodione	0.00	0.00	0.00	0.00	0.42	0.12	0.00	0.00	0.00	0.00
Maneb-group	0.09	0.00	0.61	0.00	5.36	2.45	0.36	0.00	0.71	0.38
Methamidophos	0.04	0.10	0.06	0.44	0.39	0.15	0.31	0.54	0.93	0.21
Procymidone	0.69	0.49	0.00	0.00	0.20	0.06	0.00	0.00	0.22	0.06

In 2001 the same five commodities were analysed as in 1996. Table 12 shows a comparative overview of the nine pesticides which were analysed in both 1996 and 2001.

As the table shows, there is no clear trend in the residue findings. Overall, there is a tendency towards higher percentage of findings below or at the MRL in 2001 than in 1996; at the same time there is a lower rate of exceeding MRLs in 2001. However, the comparison is difficult as the MRLs may have changed from 1996 to 2001.

For tomatoes, the results suggest that the situation with regard to residues at or below the MRL has worsened for almost all pesticides (apart from methamidophos). For apples, lettuce, strawberries and table grapes the percentage of positive findings for some pesticides increased (e.g. chlorpyriphos, maneb group and chlorothalonil on apples and table grapes, procymidone on lettuce and chlorpyriphos-methyl on table grapes), others decreased (benomyl group, iprodione and maneb group on lettuce and strawberries, acephate on apples and table grapes, chlorothalonil on lettuce).

For lettuce and strawberries, the iprodione and maneb group findings below or at the MRL have somewhat improved compared to 1996, although they still remain at a very high level.

For the majority of pesticides, the percentages of MRL exceedings decreased or remained at the same level in 2001. However, significant increases were seen for some pesticides (acephate on tomatoes and strawberries, methamidophos on apples, tomatoes and strawberries and chlorpyriphos on lettuce).

5.3. Evaluation by commodity

Tables 13 and 14 give an overview of the findings in the different commodities. With regard to all five commodities investigated, about 47 % of the samples contained residues of pesticides at or below the MRL (national or EC-MRL) and 2.2 % above the MRL (Table 13). Residues at or below the MRL were found most often in table grapes (60 %), followed by strawberries (51 %), lettuce (49 %), apples (47%) and tomatoes (33 %). MRLs (including national or EC-MRLs) were exceeded most often in lettuce (3.9 %), followed by strawberries (3.3 %), table grapes (1.8 %), tomatoes (1,5 %) and apples (1.1 %).

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

Supplementary to that the information in Table 13, 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. Here, the order of findings is different from Table 13. Residues of a specific pesticide at or below the MRL (national or EC-MRL) were found most often in table grapes (3.7 %), followed by apples (3.1 %), lettuce (2.9 %), strawberries (2.2 %) and tomatoes (1.7 %). Pesticide residues exceeding the MRL were found most often in lettuce (0.15 %), followed by strawberries (0.12 %), table grapes (0.07 %), tomatoes (0.06 %) and apples (0.04 %). This corresponds with the results in Table 13.

It can be concluded that table grapes were the commodity on which residues were most often found at or below the MRL, but that exceedances occurred most often on lettuce.

Table 13: Residues found in the five 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)	%
Apples	2641	1372	52	1241	47	28	1.1
Tomatoes	2016	1320	65	665	33	31	1.5
Lettuce	1838	866	47	901	49	71	3.9
Strawberries	1652	762	46	836	51	54	3.3
Table grapes	1721	665	39	1025	60	31	1.8
SUM	9868	4985	51	4668	47	215	2.2

Table 14: Residues found in individual determinations (ind. det.) in the five 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)	%
Apples	68074	65924	2121	3.1	29	0.04
Tomatoes	55538	54578	927	1.7	33	0.06
Lettuce	49827	48329	1422	2.9	76	0.15
Strawberries	45071	44027	988	2.2	56	0.12
Table grapes	49483	47629	1821	3.7	33	0.07
SUM	267993	260487	7279	2.7	227	0.08

It appears from Table 15 that on all five commodities analysed in 2001, plant protection products have been more frequently applied than on other commodities analysed in previous years. The commodities in 2001 show, on average, a higher percentage of positive findings at or below the MRL than the commodities analysed in the years 1997 - 2000 (Table 15), while the average rate of MRL exceedances is not generally higher.

Comparison with 1996 (same five commodities as in 2001) is impossible, as the data available do not allow such comparison.

Table 15: Overall results of the 4 - 5 commodities analysed during 1997 - 2001

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

n/a: not available

5.4. Evaluation by country

With regard to the 36 pesticides and the five commodities of the co-ordinated programme, residues at or below the MRL (national or EC-MRL) were found in 47 % of the samples. In 2.2 % of the samples, these residues exceeded MRLs (national or EC-MRLs). Differences between countries can result e.g. from different sampling approaches (whether surveillance sampling or follow-up enforcement sampling), amounts of samples analysed for pesticides that are most likely to be found, and reporting levels (cf. chapter 4.1). Table 16 summarises the results sorted by country and Figure 9 illustrates those results.

Table 16: Residues of pesticides in the five commodities as analysed in the EU Member States and EEA States

	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	215	126	59	87	40	2	0.9
DK	543	354	65	179	33	10	1.8
D	2354	987	42	1299	55	68	2.9
EL	305	77	25	208	68	20	6.6
E	215	102	47	104	48	9	4.2
F	1161	522	45	587	51	52	4.5
IRL	96	44	46	49	51	3	3.1
I	1371	855	62	501	37	15	1.1
L	87	53	61	30	34	4	4.6
NL	680	183	27	491	72	6	0.9
A	60	27	45	31	52	2	3.3
P	310	185	60	115	37	10	3.2
FIN	490	258	53	230	47	2	0.4
S	555	354	64	198	36	3	0.5
UK	827	524	63	299	36	4	0.5
Norway	507	262	52	242	48	3	0.6
Iceland	52	44	85	7	13	1	1.9
Liech-tenstein	40	28	70	11	28	1	2.5
Total	**9868**	**4985**	**51**	**4668**	**47**	**215**	**2.2**

Evaluation of the results of the 2001 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)

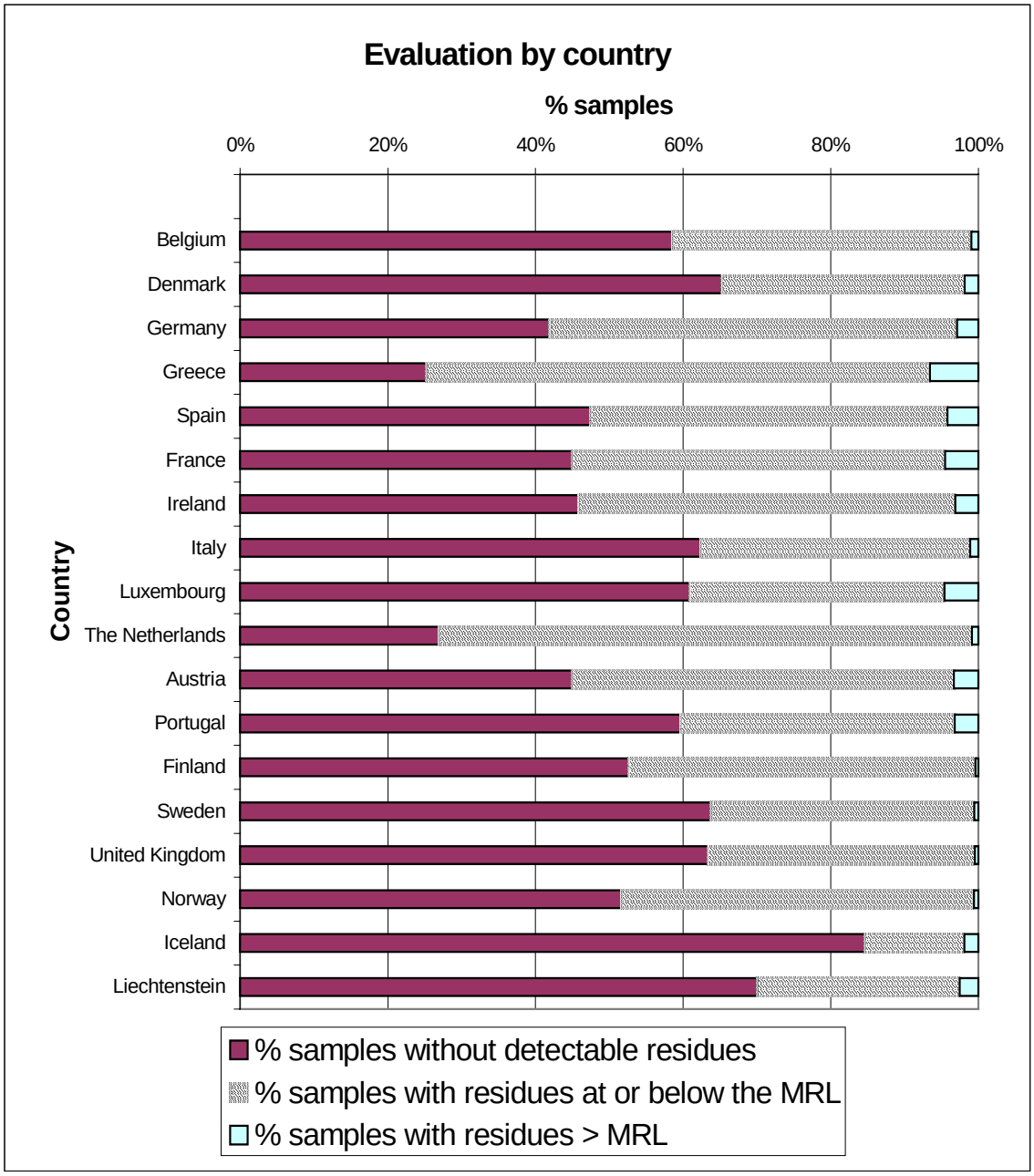

Figure 9: Percentage of samples without residues, with residues at or below the MRL and with residues exceeding the MRL sorted by country

5.5. Homogeneity exercise

In 2001, only one country (Luxembourg) provided data for the homogeneity exercise. However, all four composite apple samples analysed for methidathion were below the reporting limit and therefore the single items (units) were not analysed.

5.6. Exposure assessment

5.6.1. Chronic risk

To estimate the chronic risk to the consumer of consuming 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[26]. 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)[27]. 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 ADI) are given in Table 17.

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

[27] Example: the 90th percentile for the content of residues of the maneb group in head cabbage is determined thus: 564 samples were analysed in total in the EU and EEA States, out of which 328 samples contained no detectable residues. 159 samples showed different residue contents, categorised in 7 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). 40 further samples showed contents between 0.51 and 1.0 mg/kg (cat. 7). 90 % of all values would comprise 564*0.9=507.6 samples. Since 328 samples are without residues and 159 samples have residue contents between the reporting limit and 0.5 mg/kg, the 507th /508th sample falls within the 40 samples of category 7 (0.51-1.0 mg/kg). Because of the categorised reporting format the exact 90th percentile value cannot be given, but the 90th percentile can be given as $\leq$ 1.0 mg/kg as the upper limit of category 7 is 1.0 mg/kg.

Table 17: 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**[28] (mg pesticide / kg body weight	**Average consump-tion** (kg commodity / day)[29]	**Intake via specific commodity** (mg pesticide / day / kg body weight)[30]	**Intake in % of the ADI**
Acephate	Lettuce	≤ 0.01	0.03	--	--	--
Azinphosmethyl	Table grapes	≤ 0.01	0.005	--	--	--
Azoxystrobin	Lettuce	≤ 0.01	--	--	--	--
Benomyl group	Table grapes	≤ 0.01	0.03[31]	--	--	--
Captan	Apples	< 0.20	0.1	0.040	0.000133	0.13
Chlorothalonil	Lettuce	≤ 0.01	0.03	--	--	--
Chlorpyriphos	Table grapes	≤ 0.02	0.01	0.0138	0.0000046	0.046
Chlorpyriphos-methyl	Table grapes	≤ 0.01	0.01	--	--	--
Deltamethrin	Table grapes	≤ 0.01	0.01	--	--	--
Diazinon	Strawberries	≤ 0.01	0.002	--	--	--
Dichlofluanid	Lettuce	≤ 0.01	0.3	--	--	--
Dicofol	Apples	≤ 0.01	0.002	--	--	--
Dimethoate	Lettuce	≤ 0.01	0.002	--	--	--
Disulfotone	Not detected	--	--	--	---	--
Endosulfan	Lettuce	≤ 0.01	0.006	--	--	--
Folpet	Lettuce	≤ 0.01	0.1	--	--	--
Imazalil	Apples	≤ 0.01	0.03	--	--	--
Iprodione	Lettuce	≤ 1.0	0.06	--	--	--
Lambda-cyhalothrin	Table grapes	≤ 0.01	--	--	--	--
Malathion	Strawberries	≤ 0.01	0.3	--	--	--
Maneb-group	Lettuce	≤ 2.0	0.03/ 0.007[32]	0.0225	0.00075	2.5/11

[28] WHO/PCS/2000.1

[29] Standard European Diet of the World Health Organization

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

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

[32] Group ADI for maneb, mancozeb, metiram, zineb: 0.03; ADI for propineb: 0.007

Compound	Food item	90th percentile (mg pesticide / kg commodity)	ADI[28] (mg pesticide / kg body weight	Average consump-tion (kg commodity / day)[29]	Intake via specific commodity (mg pesticide / day / kg body weight)[30]	Intake in % of the ADI
Mecarbam	Table grapes	≤ 0.01	0.002	--	--	--
Metalaxyl	Strawberries	≤ 0.01	0.03	--	--	--
Methamidophos	Strawberries	≤ 0.01	0.004	--	--	--
Methidathion	Table grapes	≤ 0.01	0.001	--	--	--
Omethoate	Lettuce	≤ 0.01	--	--	--	--
Oxydemeton-methyl	Not detected	--	--	--	--	--
Permethrin	Lettuce	≤ 0.01	0.05	--	--	--
Phorate	Lettuce	≤ 0.01	0.0005	--	--	--
Pirimiphos-methyl	Table grapes	≤ 0.01	0.03	--	--	--
Propyzamide	Lettuce	≤ 0.01	--	--	--	--
Thiabendazol	Apples	≤ 0.01	0.1	--	--	--
Triazophos	Apples	≤ 0.01	--	--	--	--
Thiomethon	Not detected	--	--	--	--	--
Vinclozolin	Lettuce	≤ 0.01	0.01	--	--	--

As shown by the results in Table 17, the intake of pesticide residues does not exceed the ADI in any case. It is below a percentage of 11 % of the ADI for all pesticides. The exposure ranges from 0.046 % of the ADI for chlorpyriphos on table grapes, to 11 % of the ADI for the maneb group on lettuce (calculated with the ADI 0.007 for propineb).

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[33]. 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 2001 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[34], taking into account unit-to-unit variability of single units, was used for apples as a medium-sized crop with a unit weight ≤ 250 g. For lettuce (unit weight > 250 g) and table grapes, which can show large variations

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

[34] 2000 Joint FAO/WHO meeting on Pesticide Residues, Geneva 20-29 September 2000, p.15

between the different grape bunches, a default variability factor of five has been used. On the basis of those data, an exposure assessment for an adult of 70.1 kg and a toddler 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). The results are shown in Table 18.

Table 18: Exposure assessment for acute risk from the pesticides investigated in the 2001 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	**97.5th percentile of consumption** (kg commodity / day)[35]	**Homo-geneity factor**	**Intake via specific commodity** (mg pesticide / day / kg body weight)	**Intake in % of the acute Reference Dose**
Chlorpyri-phos	Table grapes	1.2 *EC-MRL: 0.50*	0.1	0.190 (adult)/ 0.158 (toddler)	5	0.0163 (adult)	16 % (adult)
						0.0654 (toddler)	65 % (toddler)
Deltamethrin	Table grapes	0.40 *EC-MRL: 0.10*	0.05	0.190 (adult)/ 0.158 (toddler)	5	0.0054 (adult)	11 % (adult)
						0.0218 (toddler)	44 % (toddler)
Diazinon	Straw-berries	0.34 *EC-MRL: 0.5/0.02**	0.03	0.203 (adult)/ 0.111 (toddler)	1	0.000984 (adult)	3.3 (adult)
						0.00260 (toddler)	8.7 (toddler)
Endosulfan[36]	Lettuce	3.5 *EC-MRL: 1.0/0.05**	0.02	0.093 (adult)/ 0.025 (toddler)	5	0.0232 (adult)	116 % (adult)
						0.0302 (toddler)	151 % (toddler)

* applicable from 1 July 2001

[35] Consumer Exposure Model, UK

[36] No Rapid Alert has been notified by France where this residue has been detected

Compound	Food item	Maximum residue found in a composite sample (mg pesticide / kg commodity	acute Reference Dose (mg pesticide / kg body weight	97.5th percentile of consumption (kg commodity / day)[37]	Homo-geneity factor	Intake via specific commodity (mg pesticide / day / kg body weight)	Intake in % of the acute Reference Dose
Methamido-phos	Straw-berries	1.12 *EC-MRL: 0.01*	0.01	0.203 (adult)/ 0.111 (toddler)	1	0.00324 (adult)	32 % (adult)
						0.00857 (toddler)	86 % (toddler)
Methidathion	Table grapes	0.16 *EC-MRL: 0.50*	0.01	0.190 (adult)/ 0.158 (toddler)	5	0.00217 (adult)	22 % (adult)
						0.00872 (toddler)	87 % (toddler)
Permethrin	Lettuce	0.5 *EC-MRL: 2.0*	1.5	0.093 (adult)/ 0.025 (toddler)	5	0.00331 (adult)	0.2 % (adult)
						0.00431 (toddler)	0.3 % (toddler)
Triazophos	Apples	0.021 *EC-MRL: 0.02*	0.001	0.308 (adult)/ 0.199 (toddler)	7	0.000294 (adult)	29 % (adult)
						0.00126 (toddler)	126 % (toddler)

As Table 18 shows, the intakes for the highest residues in a composite sample for most of the pesticides analysed are below the acute RfD. However, for endosulfan in lettuce the acute RfD is exceeded for both adults and toddlers. For triazophos in apples the acute RfD is exceeded for toddlers, but not for adults. These results give some reason for concern as they indicate that a health risk cannot be excluded. This concerns mainly toddlers when consuming large amounts of apples or lettuce.

In the case of endosulfan on lettuce, where the MRL was significantly exceeded, no Rapid Alert had been notified by the country who has detected the exceedance (France).

[37] Consumer Exposure Model, UK

6. SAMPLING

Commission Directive 79/700/EEC established sampling methods for the official control of pesticide residues in and on fruit and vegetables. Member States are required to use these methods for their pesticide residue monitoring. Table 19 shows the information given on sampling in the summaries of the national monitoring reports of the Member States and EEA States. In most cases, sampling followed national plans that were often established taking into consideration consumption, production, imported and exported products and risks (e.g. results from previous years).

Table 20 shows the distribution of domestic/imported samples and the relationship of the number of samples taken to the population size. The relationship of domestic and imported samples should reflect the situation in the respective Member State. In total (EU and EEA States), about 39 % of the samples were domestic samples, 39 % were imported samples (incl. those from other EU Member States) and 21 % were of unknown origin. This was mainly due to the fact that Italy did not distinguish imported from domestic. 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 19: Summary on sampling by the national authorities (information taken from the one-page summaries)

Country	Summary on sampling
B	Sampling was carried out 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, domestic samples also at producers and shops, processed food at shops.
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.
EL	Samples were randomly taken from points of entry, wholesalers, retailers and farm gates.
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.

Country	Summary on sampling
F	Crops and processed foods are sampled by surveillance inspectors, following the sampling procedure requirements, at growers, wholesalers and retailers. The general sampling programme is drawn up by the central authority and takes account of national and European priorities. This programme takes account of the dietary proportion of plant products, the EU co-ordinated programme, previous results and targeted inspection on certain fruits and vegetables (peppers and salads).
IRL	Samples are taken in accordance with an annual monitoring programme which is agreed between the Pesticide Control Service and the Food Safety Authority of Ireland. This programme takes account of the consumption patterns of Irish adults, historical results from previous years, the EU co-ordinated monitoring programme and the extent to which some foods are consumed in a raw unprocessed manner. Samples are taken primarily at wholesale level by officers of the Pesticide Control Service.
I	Not provided.
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. Only routine sampling (no follow-up enforcement sampling) was done. 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 violations. As required by EU-directive 90/642/EU, a monitoring plan is made. Directive 79/700/EEC (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, the co-ordinated exercise, results of former measurements as well as analytical and budgetary capacities.
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. Cereals were often sampled from milling plants and a small fraction of samples were collected at farm gate and at retail level.

Country	Summary on sampling
FIN	The national and EC co-ordinated pesticide residues monitoring was carried out according to an annual program. 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.
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. Codex Alimentarius guidelines were followed where practicable. Data from other sources are considered as well in determining the surveillance programme.
Norway	Samples were taken mainly from wholesaler's warehouses but also at retail outlets and farm gates. The number of surveillance samples of each commodity roughly reflects their share of the market, but more samples were taken of commodities suspected to contain residues. For samples exceeding MRLs compliance samples were taken as a follow up.
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 imported.
Liech-tenstein	The annual sampling plan is based on domestic production and the ESA[38] co-ordinated programme. The programme started in the second half of 2001. 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.

[38] EFTA Surveillance Authority

Table 20: 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

Country	Total number of samples taken	Number of inhabitants per country[39]	Samples taken per 100 000 inhabitants	No. of domestic samples taken	% from total sample number	No. of imported samples taken[40]	% from total sample number	No. of samples with unknown origin	% from total sample number
B	1029	10,263,414	10	313	30	175	17	541	53
DK	3481	5,349,212	65	1175	34	2306	66	0	0
D	6340	82,259,540	8	2822	45	3518	55	0	0
EL	1739	10,542,808	16	1413	81	326	19	0	0
E	3341	40,121,673	8	3341	100	0	0	0	0
F	4369	59,037,225	7	3051	70	1318	30	0	0
IRL	331	3,826,159	9	109	33	222	67	0	0
I	9365	57,844,017	16	0	0	0	0	9365	100
L	171	441,300	39	30	18	141	82	0	0
NL	2896	15,987,075	18	1280	44	1616	56	0	0
A	962	8,121,345	12	350	36	612	64	0	0
P	604	10,262,877	6	445	74	159	26	0	0
FIN	2439	5,181,115	47	496	20	1943	80	0	0
S	2949	8,882,792	33	866	29	2083	71	0	0
UK	3144	59,862,820	5	1400	45	1744	55	0	0
Norway	2618	4,503,436	58	1003	38	1615	62	0	0
Iceland	308	283,361	109	58	19	250	81	0	0
Liechtenstein	63	32,863	192	36	57	27	43	0	0
Total	**46149**	**382,803,032**	**12**	**18188**	**39**	**18055**	**39**	**9906**	**21**

* No data were provided by Italy

[39] Eurostat, New Cronos database, Population figures for 1 January 2001

[40] Including samples from other EU Member States

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[41] 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 2001/42/EC lays down that Member States should provide information about the details of accreditation of the monitoring laboratories (incl. accreditation certificates), about the application of the EU Quality Control Procedures and about their participation in proficiency or ring tests. 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 regularly organised (the last was carried out in 2002).

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. This Regulation was fully applicable for 2001.

Table 21 and Figures 10 - 12 give an overview of the situation regarding accreditation of monitoring laboratories and participation in proficiency tests. Table 21 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 4811/2001.

The laboratory situation has not further improved compared to 2000 (Figures 10 - 12). There are still 4 countries out of 18 (22 %) who have not accredited any of their laboratories and a further 3 (17 %) have accredited only some of their laboratories. Only 61 % of the countries (11 out of 18) have accredited all their laboratories. When comparing the data with previous years it has to be considered that the total number of participating countries has risen from 16 in 1997 to 17 in 1999 and 18 in 2000 and 2001.

In the EU and EEA States in total 46,149 samples (sum of fresh and processed products) were analysed. 33,491 samples (72.6 %) were analysed by laboratories accredited for the most important pesticide-commodity combinations, 1,311 samples (2.8 %) by laboratories accredited for only some pesticide-commodity combinations and 11,347 (24.6 %) by laboratories which are not accredited. This is illustrated in Figure 11.

In conclusion, around 70 % of the samples were analysed by laboratories which were accredited for the most important pesticide-commodity combinations, whereas around 30 % were analysed by laboratories either accredited only for some pesticide-commodity combinations or not accredited at all.

The breakdown of the samples analysed by accredited/not accredited laboratories by country is shown in Figure 12.

---

[41] Now ISO 17025

Status of laboratory accreditation: Percentage of countries with accreditation of all, of some or of none of the monitoring laboratories in 2001 compared to previous years:

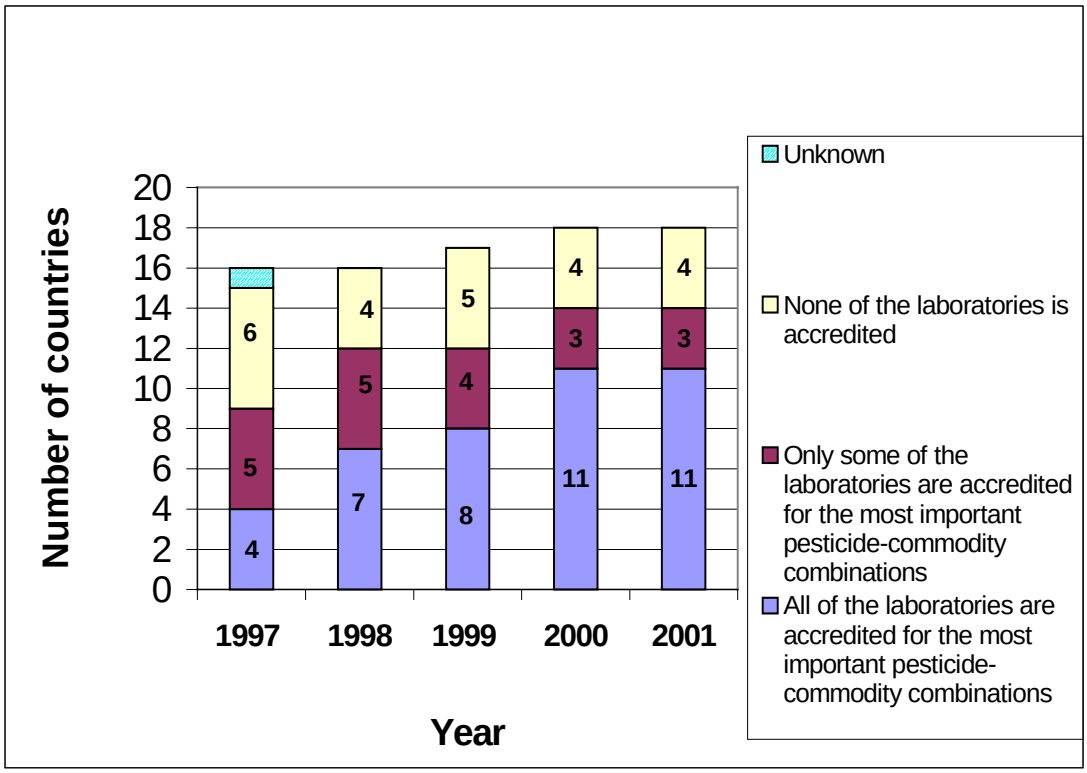

Figure 10: Number of countries with accreditation of all monitoring laboratories, of some monitoring laboratories and of none of the monitoring laboratories

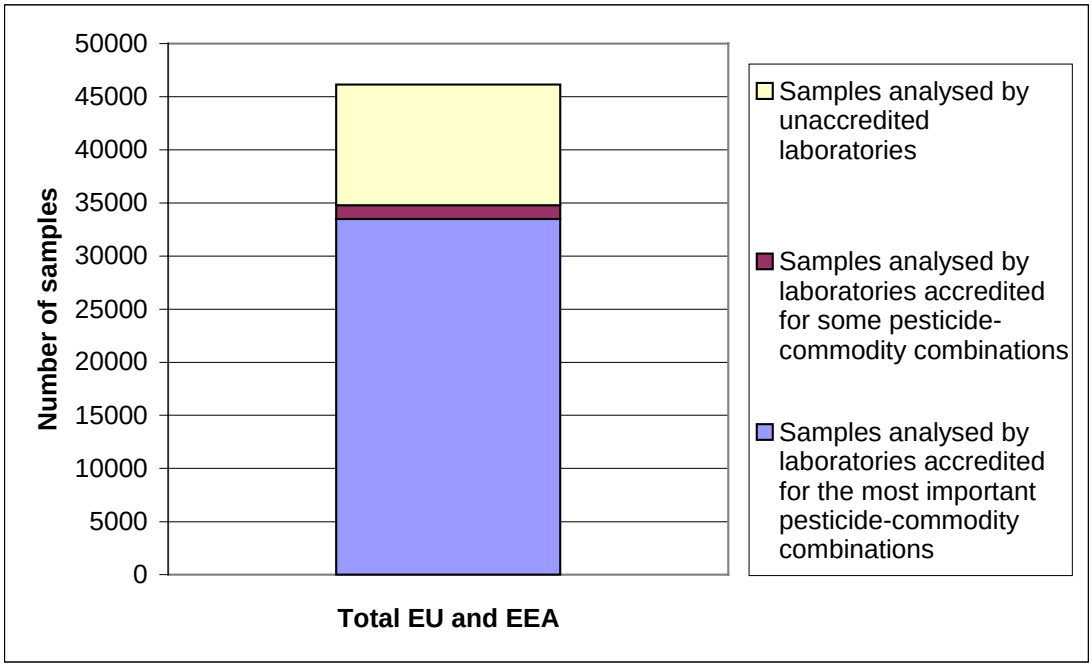

Figure 11: Numbers of samples analysed by laboratories accredited for the most important pesticide-commodity combinations, accredited for only some pesticide-commodity combinations or by not accredited laboratories in the EU and EEA States in the year 2001.*
** For Italy, the 2000 data on accreditation was used.*

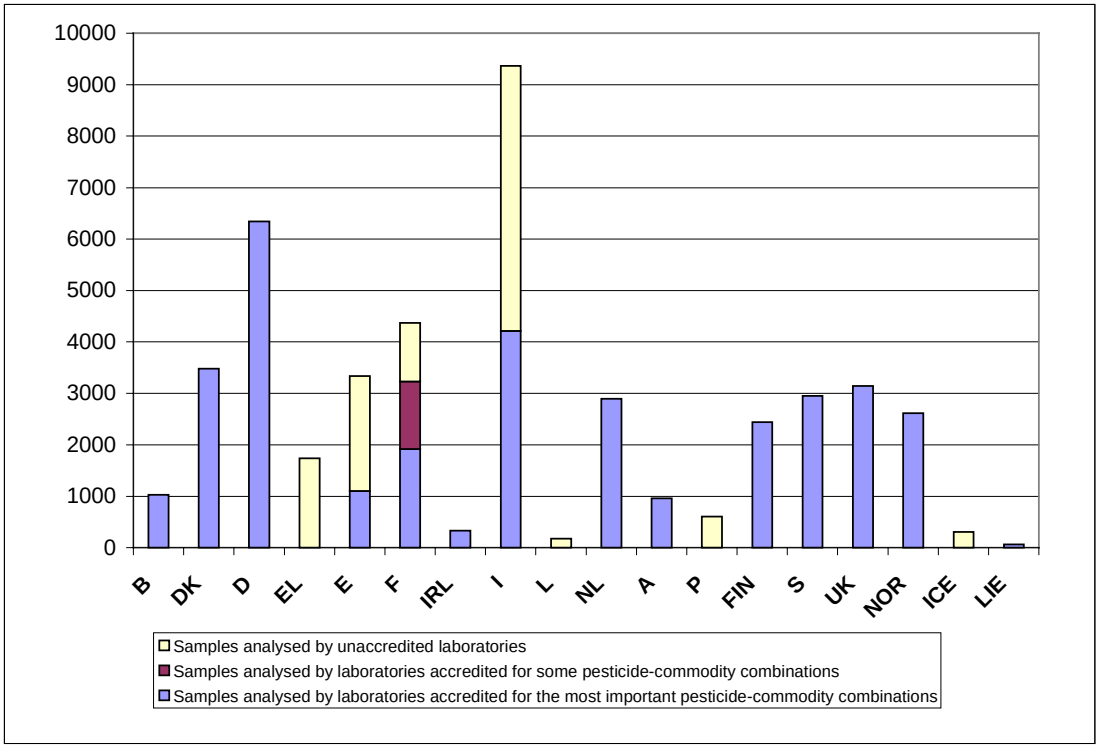

Figure 12: Numbers of samples analysed by laboratories accredited for the most important pesticide-commodity combinations, accredited for only some pesticide-commodity combinations or by not accredited laboratories by country in the year 2001.*
** For Italy, the 2000 data on accreditation was used.*

Apart from the information on accreditation of laboratories, Table 21 also gives an overview of other laboratory quality issues, such as the implementation of the EU QC procedures and the participation in proficiency tests. 14 out of 18 countries reported on this issue, while 4 countries did not give any specific information. According to this information, 10 out of the 14 reporting countries have fully implemented at least 70 % of the EU QC procedures. The remainder of the QC procedures is partly implemented in most of the countries.

13 out of the 14 reporting countries also took part in proficiency tests in 2001[42]. Since no EU proficiency test was organised in 2001 the most often used proficiency test scheme was FAPAS[43] (11 countries took part in some of the FAPAS rounds in 2001). Some countries also took part in other, nationally organised, proficiency tests.

Table 21: 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	Accreditation certificates provided	Participation in proficiency tests	Implementation of EU Quality Control Procedures (QC procedures)
B	3	Accredited by BELTEST	Yes	2 laboratories took part in a chlormequat proficiency test and 1 in FAPAS	All three laboratories have implemented at least 70 % of the QC procedures
DK	2 (1 main lab performing 95 % of all analyses)	Accredited by DANAK	Yes	FAPAS, GC multi-residue method, imazalil, thiabendazol	In both laboratories at least 70 % of the QC procedures are implemented
D	49	Accredited	No	No information	No information
EL	6	In preparatory phase	--*	No information	No information
E	14	3 ENAC accredited laboratories (doing approx. 33 % of the analyses).	Yes	No information	No information
F	6	2 laboratories, which performed	Yes	All laboratories were involved in	At least 80 % of the QC procedures are

[42] No information on proficiency tests is available for Austria

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

Country	No. of laboratories	Accreditation	Accreditation certificates provided	Participation in proficiency tests	Implementation of EU Quality Control Procedures (QC procedures)
		around 44 % of the analyses, are fully accredited by COFRAC, one laboratory, performing approx. 30 % of the anaylses is partly accredited, the others are not accredited		some proficiency tests with BIPEA (4 rounds per year).	implemented
IRL	1	Accredited by NAB Ireland	Yes	FAPAS for pesticides in fruit and vegetables	40 % of the QC procedures are fully implemented, 60 % are partly implemented
I *(data from 2000 report as no new data provided)*	60	17 laboratories out of 60 are accredited, performing approx. 45 % of the analyses	No	No information	No information
L	1	In preparatory phase for accreditation	--*	FAPAS	10 % of QC procedures fully implemented, 90 partly implemented
NL	1	Accredited by RvA	Yes	FAPAS	Approx. 80 % of QC procedures fully implemented, 20 % partly implemented
A	4	Accredited	Yes	No info	At least 80 % of QC procedures implemented
P	3	None of the laboratories accredited yet	--*	Two of the labs participated in FAPAS	Different status of the QC procedure implementation in the 4 laboratories, between 10 % and 70 % of the QC procedures are fully implemented.

Country	No. of laboratories	Accreditation	Accreditation certificates provided	Participation in proficiency tests	Implementation of EU Quality Control Procedures (QC procedures)
FIN	2	Accredited by FINAS	Yes	Main laboratory took part in FAPAS	At least 60 % of the QC proceudres are fully implemented, 40 % are partly implemented
S	1 contracted laboratory	Accredited by SWEDAC for all methods used	Yes	FAPAS and Finnish customs laboratory (bromide, maneb group)	At least 70 % of the QC procedures are fully implemented, 30 % are partly implemented
UK	2	Accredited by UKAS	Yes	FAPAS for both labs plus NAMAS for one of them	Fully implemented
Norway	1	Accredited by NA	Yes	FAPAS and Nordic intercalibration for maneb group and chlormequat	Approx. 80 % of the QC procedures fully implemented, 20 % partly implemented
Iceland	1	In preparatory phase	--*	FAPAS	Approx. 80% implemented, 20 % not implemented
Liechtenstein	1	Accredited by DACH	Yes	Chemical and chemo-physical analyses	Approx. 90 % of QC procedures implemented

8. RAPID ALERT SYSTEM

The Rapid Alert System for Food and Feed (RASFF) was established by Council Directive 92/59/EEC[44] on General Product Safety[45].

Products entailing a serious and immediate risk to the health and safety of the consumer are classified as ALERT notifications according to Article 8 of Directive 92/59/EEC. The notifying Member State informs the Commission, which then notifies this to the contact

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

[45] This Directive will be repealed by Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on General Product Safety from 15 January 2004

points in all Member States. After receiving an ALERT notification, Member States should take appropriate action.

Notifications which do not fulfil the requirements laid down in Article 8 of Council Directive 92/59/EEC on General Product Safety, 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 2001 **13 ALERTS** and **61 NON-ALERTS** were notified in relation to pesticide residues. Eight of the ALERTS related to products from Member States, 5 related to products from third countries (3 of them candidate countries). With regard to the NON-ALERTS, 21 related to products from Member States and 40 to products from third countries.

Seven ALERTS and 25 NON-ALERTS related to herbs and spices. The countries of origin were mainly the UK (5 ALERTS and 8 NON-ALERTS), India (9 NON-ALERTS) and Egypt (7 NON-ALERTS).

Five ALERTS and 24 NON-ALERTS related to fresh fruit and vegetables. Grapes from Greece and Cyprus as well as peppers from Thailand were the commodities/countries most often involved.

12 NON-ALERTS related to tea from China.

The pesticides involved in the ALERTS were Ethion in Chilli powder from the UK (3), cypermethrin in chilli powder from the UK (2), parathion-methyl (2), monocrotophos in grapes from Cyprus (2), penconazole (1), procymidone (1), prochloraz (1), chlormequat in pear juice (baby food) (1).

The number of both ALERTS and NON-ALERTS has increased significantly compared to 2000, where seven ALERTS and 27 NON-ALERTS were issued. This does not necessarily mean that the residue situation has worsened, but could be due to an increased awareness within Member States with regard to the use of the Rapid Alert System. This could be 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). However, the guidance document is still being used on a voluntary basis and is currently not being used by all 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 at an early stage of specific problems 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[46] (Norway, Iceland and Liechtenstein), monitored pesticide residues in foodstuffs of plant origin. Overall, some 46,000 samples were analysed for, on average, 145 different pesticides. About 93 % of the samples analysed were fresh (incl. frozen) fruit, vegetables and cereals, about 7 % were processed products.

In 37 % of the fruit, vegetable and cereal samples and processed products, residues of pesticides at or below the MRL (national or EC-MRL) were detected. In 3.6 % of all samples, residues above the MRL (national or EC-MRL) were found. 60 % of the samples contained no pesticide residues[47]. When only fresh products are considered the percentage of MRL exceedances increases to 3.9 % instead of 3.6 % and the percentage of samples without residues is 59 %.

There is no clear overall trend in the occurrence of residues in the last 6 years. The percentage of samples with no detectable residues has slightly decreased compared to previous years, whereas the percentage of samples with residues at or below MRL has increased compared to the years 1999 and 2000, bringing the levels back to that found during 1996 - 1998. The percentage of exceedances has decreased compared with data of the last two years, but is higher than that found during 1996 - 1998.

In 2001, the percentage of samples containing multiple residues has significantly increased compared to the 4 previous years. Only the 1996 data showed higher levels, but the 1996 data should be treated with caution, since only 11 countries delivered data[48].

In 2001, only the total number of samples with multiple residues can be considered and compared to previous years, but not the distribution in the different categories (samples with 2, 3, 4, etc. residues), since data from one country, which analysed a significant amount of samples, were incomplete.

It is important to note that, when comparing the results of the years 1996 to 2001 some caution is necessary. It has to be taken into account that the data have not been collected under exactly the same conditions. Differences existed in a number of factors, e.g. in the number of participating countries, which rose from 16 to 18, in the design and priorities set for the national programmes (the sampling may have been more or less targeted towards specific problems), in the total number of samples taken, in the legislation (more harmonised EU-MRLs have been set over the years, national MRLs may have changed), as well as in the enhanced analytical possibilities of the laboratories.

The most frequently found pesticides have been reported separately for fruit and vegetables and for cereals in 2001. Like in previous years, mainly fungicides were found on fruit and

---

[46] Agreement on the European Economic Area

[47] This paragraph relates to the total of samples analysed, including processed products

[48] In 1997 and 1998 fifteen countries out of sixteen delivered data for this overview, in 1999 sixteen countries out of seventeen and in 2000 and 2001 all eighteen countries delivered data.

vegetables whereas, on cereals, the pesticides found were mainly insecticides. The 10 most frequently found pesticides found in 2001 were almost identical with those found in 2000 and the majority corresponded also to those found during 1996 - 1999. However, as explained in the 2000 report this was mainly a result of a changed reporting procedure in 2000, where for the first time the relative frequency of pesticides' occurrence was reported instead of the frequency of absolute numbers of findings. This leads to a tendency for prevalence of residues detected by single residue methods (i.e. chlormequat, inorganic bromide).

9.2. EU co-ordinated monitoring programme

In a special co-ordinated programme, about 9,800 samples of five commodities (apples, tomatoes, lettuce, strawberries, and table grapes) were analysed for 36 different pesticides. Compared to previous years, the programme has been substantially extended, especially by the number of different pesticides sought, but also by the number of commodities included. Although the total number of samples required in the co-ordinated programme in the EU is constant (496 samples[49] every year), in 2001 about twice the number of samples of previous years were analysed. The five commodities were the same as in 1996 and the nine pesticides analysed in 1996 were included in the 36 analysed during 2001.

It appears from the results that the commodities analysed in 2001 were all commodities on which plant protection products are frequently applied, which is in line with the findings of the year 1996 on the same commodities. In 47 % of the samples, residues of one of the 35[50] pesticides were found below or at the MRL (national or EC-MRL) and in 2.2 % of the samples MRLs (national or EC-MRLs) were exceeded. Only 51 % of the samples contained no detectable residues.

In this co-ordinated programme, residues of one of the 35 pesticides at or below the MRL were found most often in table grapes (60 %), followed by strawberries (51 %), lettuce (49 %), apples (47 %) and tomatoes (33 %). Residues exceeding the MRL were found most often in lettuce (3.9 %), followed by strawberries (3.3 %), table grapes (1.8 %), tomatoes (1.5 %) and apples (1.1 %).

Of the 35 pesticides under the co-ordinated programme, residues of the maneb group were found most often (16 %), followed by iprodione (10.5 %), procymidone (10.4 %), benomyl group (8.7 %), captan/folpet (sum) (8.5 %), chlorpyriphos (5.3 %), endosulfan (4.2 %), vinclozolin (3.4 %) and thiabendazole (3.0 %)[51]. The remainder of the pesticides were found in percentages below 3 %.

Residues of the maneb group exceeded MRLs most often (0.61 %), followed by the benomyl group (0.44 %), endosulfan (0.32 %), dicofol and methamidophos (0.28 % each).

The highest residues found in a composite sample in this co-ordinated programme were 31 mg/kg maneb group, 29.9 mg/kg captan/folpet (sum), 14.8 mg/kg chlorothalonil, 13 mg/kg dichlofluanid, 14.8 mg/kg vinclozolin and 10.8 mg/kg procymidone. These extremely high values were all found on lettuce.

---

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

[50] 36 pesticides were analysed, but for the comparison with the MRL captan and folpet were combined since the MRL relates to the sum of captan and folpet.

[51] Percentages in this paragraph include sum of samples with residues at or below the MRL and exceeding the MRL

The most important pesticide-commodity combinations where detectable residues have been found at or below the MRL and above the MRL were maneb group/lettuce, maneb group/table grapes, iprodione/lettuce and benomyl group/strawberries. With regard to MRL exceedances, the most important pesticide-commodity combinations were maneb group/lettuce and benomyl group/strawberries.

In comparison with the 1996 data, the results for the nine pesticides analysed in both years show no clear overall trend. There is a tendency towards higher percentages of findings at/below the MRL in 2001 compared to 1996; at the same time there is a lower rate of exceeding MRLs in 2001. However, the latter also depends on the actual level of the MRLs, which may have changed between 1996 and 2001.

Chronic exposure assessments demonstrate that ADI[52] values were not exceeded for these pesticide/commodity combinations. However, for the assessment of acute risk, the data show that the ARfD[53] was exceeded for endosulfan/lettuce (adults and toddlers) and for triazophos/apples (toddlers). This means that there is some reason for concern as a health risk cannot be excluded. In particular, this concerns toddlers who eat large amounts of these commodities.

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, imported/domestic shares and risks (e.g. results from previous years).

Accreditation of laboratories has not improved compared to 2000. Accreditation has been completed in only 11 out of 18 countries (about 60 %). In the remaining 7 countries (40 %), accreditation was either achieved only for a part of the laboratories or for none of them.

With regard to the monitoring samples (national and EU programmes) taken in the EU and EEA States, about 70 % were analysed by laboratories which were accredited for the most important pesticide-commodity combinations, whereas about 30 % were analysed by laboratories which were either accredited for only some pesticide-commodity combinations or not accredited at all. However, the majority of the participating countries reported that at least 70 % of the EU QC procedures had been fully implemented, the remaining 30 % had been partly implemented in most of the countries.

13 countries reported that they took part in proficiency tests in 2001. No information is available for the remaining 5 countries. Since in 2001 no EU proficiency test was organised, most countries took part in schemes such as FAPAS[54] or in nationally organised proficiency tests.

[52] Acceptable Daily Intake

[53] Acute Reference Dose

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