CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION
INTERNATIONAL CO-OPERATIVE PROGRAMME ON ASSESSMENT AND MONITORING OF AIR POLLUTION EFFECTS ON FORESTS
and
EUROPEAN UNION SCHEME
ON THE PROTECTION OF FORESTS AGAINST ATMOSPHERIC POLLUTION

ICP-Forests

3rd Needle/Leaf Interlaboratory Test 1997/98

Results

Prepared by: **North Rhine-Westphalia State Environment Agency LUA), D- 45133 Essen**

Author: **Dr. Ulrich Bartels**
assisted by
Ursula Busch, Gerd Cousen, Hans Joachim Fermer

In co-operation with: **Austrian Federal Forest Research Centre, Vienna**
Bundesministerium f. Ernährung, Landwirtschaft und Forsten, Bonn

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ICP-Forests 3rd Needle/Leaf Interlaboratory Test 1997/98

Results

(State: August 1st, 1998)

by

Dr. Ulrich Bartels

North Rhine-Westfalia State Environment Agency (LUA)
Wallneyer Str. 6 * D-45133 Essen
Telephone: +49-2361/37595-2807 Fax: +49-2361/37595-2828
e-mail: ulrich.bartels@essen.lua.nrw.de

1.1 Introduction

ICP-Forests of UN-ECE in collaboration with EU initialised a programme for intensive and continuous monitoring of forest ecosystems for Europe in order to realise a better understanding of air pollution processes. An important task in this field is the needle/leaf-analysis of trees, because they serve as bioindicators for nutrition state and damages.

Necessary is the harmonising and the improvement of analytical techniques. A high and comparable laboratory standard in all countries is indispensable for a European-wide survey of forest state. Important steps on this way have been the edition of the „Manual on methods and criteria for harmonised sampling, assessment, monitoring and analysis of the effects of air pollution on forests" (UN-ECE, Hamburg and Prague 1994) and the performance of the first European needle/leaf interlaboratory test on two certified standards (BCR 100-beech leaves and BCR 101 - spruce needles) with 24 laboratories from 21 countries. , organised by France in 1993.
The intensive discussion of ICP-expert panel in As, Norway, 8-9 March 1994 ended with the recommendation of a second test with 4 unknown samples (Spruce, pine, oak) during the running level-II monitoring programme. It was organised by Germany in 1995/96 and subsequently discussed on expert panel in Vienna 24-25 February 1997 (BARTELS 1996, BARTELS 1997, STEFAN et al. 1997). The results of Nitrogen, Phosphorus, Calcium, Potassium, and Manganese were stated as very good or good, these of Magnesium, Zinc, Iron and Copper as acceptable, but the values of Sulphur have been stated as problematic due to many intolerable outliers. The comparability's of other optional elements (Sodium, Lead and Aluminium) were found as not acceptable. The expert panel in Vienna therefore decided a complete repetition and authorised the Landesumweltamt North-Rhine-Westfalia (LUA) to organise another interlaboratory test on foliage.

These new results will be commented on in the following text. They offer an additional opportunity to actualise chapter 4. „Sampling and analysis of needles and leaves" of the above mentioned manual, a complex which should be discussed on the next expert panel. Besides, most of the participants will surely agree that European-wide ring tests should become routine to stabilise and enhance analytical standard and comparability of the forest investigation programme.

1.2 Material

In October 1997 the LUA sent dried plant powder of the following five samples to 51 European laboratories:

1. Spruce needles (Finland)
2. Pine needles (Finland)
3. Spruce needles (Germany)
4. Oak leaves (Spain)*
5. Beech leaves (Slovenia)

All materials were foremost ground with a Retsch-centrifugal-mill (sieve o.25 mm, Cr-Ni steel) and homogenised by the LUA-laboratory by shaking over head for 24 hours before dispatch.
I have to thank **Dr. Hannu Raitio** (Parkano,FIN), **Dr. Primoz Simoncic** (Ljubljana, SLO), **Mr. Lutz Genßler** (Recklinghausen, D) and their co-workers for sampling and to my co-worker **Hans-Joachim Fermer** for preparing the samples.

*** Sample 4 was „erroneous" declared as „Oak leaves (Germany)". But indeed it was identical with sample 3 („quercus ilex-Spain") of the 2nd interlaboratory test 1995/96, kindly made available by Dr. Maria R. Gonzalez Cascon (Madrid, E). To all appearance only Lab. 4a remarked this after comparing the X-ray spectra.**

1.3 Participant countries

51 laboratories from 29 countries joined this test (1st. test: 24/21; 2nd test: 39/25).
Figure 1 gives an overview of the participant countries. Because of diverse problems we got no results from Iceland, Latvia, The Netherlands and Belarus.

The code numbers of the laboratories are mostly the same as in the last interlaboratory test to make it easy to compare the two runs. Only lab 4a got no. 4 in this run, lab 4b got no. 4a. No's 23a and 45a are different sets of the same laboratories (23 or. 45). Set 23 offers the results from wet digestion, set 23a those after dry ashing. This is very helpful, because the last ring test gave essential facts for the assumption that dry ashing methods would cause too low results.

The values of laboratories 4, 4a and 51 base on X-ray-analysis (with exception of N and C).

ICP - Forests 3 rd. Needle/Leaf Interlaboratory Test 1997/1998

Participating countries

FBVA-FFCC / JLeitner

1.4 Task

The laboratories were asked to analyse the following elements with three replicates before December 31, 1997:

a) mandatory elements	*b) optional elements*	*c) additional elements*
Nitrogen	*Sodium*	
Sulphur	*Zinc*	
Phosphorus	*Manganese*	
Magnesium	*Iron*	*no limitation*
Calcium	*Copper*	
Potassium	*Lead*	
	Aluminium	
	Boron	

The samples - moisture content was about 5% - were to be dried at 80 °Celsius prior to analysis. Anyhow all results had to be reported as by dry matter (105 °C). With a few exceptions all laboratories analysed the complete list of mandatory elements and most of the optional elements. An overview is given in **Table 1**.

All laboratories were given the opportunity to recheck their data within March 15th, 1998. Nevertheless the discipline of a few of laboratories was not very high. Some data and even three complete new data sets (Lab 8a, Lab 22, Lab 35) and 4 sets with mostly drymass corrections reached LUA later than April 1st. This caused much effort for the organisation.

A pre-report - for information of participant laboratories only - was shipped within may 1998 to give them a last chance for remarks or corrections. Because the organisation received only two answers with thanks and an annotation about determination of water content (see chapter 2.4.17) it is to assume, that all data and conclusions of pre-report are correct and accepted.

2. Evaluation

2.1 Method of data calculation

A computer programme (RING 4.0, author: Dr. Steffen Uhlig, Berlin) was used to calculate the ring test data. The evaluation was carried out for all mandatory elements, all optional elements and for Cadmium and Carbon. All other elements with only a few data bases are given with their lab means in **annex, pp 4-1** without further comments. These data are very useful to characterise the samples.

The evaluation is presented in the same way as in the past for the 2nd ring test and calculated on the basis of modern „robust statistics". The procedure is given by LISCHER in the 'Schweizer Lebensmittelbuch' ('Swiss food handbook', chapter 60A). Its advantage is that it works without elimination of outliners and its completely absence of any manipulations by the ring-test leader. It is based on a monofactoral variance analysis but requires no assumptions on the distribution of the measurement deviations. The disadvantage is the black box character of the used iterative calculations. They are normally not understandable for most chemists without deeper knowledge of statistic methods. Some foundations are cited and translated from chapter 60 A, Schweizer Lebensmittelbuch:

Table 1.: Participant laboratories/analysed elements

Participants of 3rd. ICP-Forests needle/leaf laboratory intercomparision 1997/98

Nr.	N	S	P	Ca	Mg	K	Na	Zn	Mn	Fe	Cu	Pb	Al	B	Cd	Cl	C	F	Cr	Ni	Co	As	Y	Zr	Cs	Mo	Se	Br	Si	Rb	Sr	Ba	Sr	La
1	X	X	X	X	X	X		X	X																									
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X																				
3	X	X	X	X	X	X		X	X	X								X																
3a		X																																
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4a		X	X	X	X	X	X	X	X	X	X	X	X			X													X					
5	X	X	X	X	X	X	X	X	X	X	X																							
6	X	X	X	X	X	X		X	X	X	X	X	X	X																		X		
7	X	X	X	X	X	X	X	X	X	X	X		X	X			X																	
8	X	X	X	X	X	X	X	X	X	X	X																							
8a	X	X	X	X	X	X	X	X	X	X	X	X	X																					
9	X	X	X	X	X	X	X	X	X	X	X	X	X		X																			
10	X	X	X	X	X	X		X	X	X	X		X	X																				
11	X	X	X	X	X	X																												
12	X	X	X	X	X	X	X	X	X	X	X		X				X		X	X														
13	X		X	X	X	X		X	X	X	X	X	X		X																			
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																			
15	X		X	X	X	X																												
17	X	X	X	X	X	X	X	X	X	X	X	X	X		X																			
18	X	X	X	X	X	X	X	X	X	X	X		X	X					X	X														
19	X	X	X	X	X	X																												
20	X	X	X	X	X	X		X	X	X																								
21	X	X	X	X	X	X	X	X	X	X	X			X																				
22	X	X	X	X	X	X	X	X	X	X			X				X																	
23	X	X	X	X	X	X	X	X	X	X	X		X	X																				
23a			X	X	X	X	X	X	X	X	X		X	X																				
24	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X																	
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																			
26		X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X									X			X	X	
27	X		X	X	X	X	X	X	X	X	X	X																						
28	X	X	X	X	X	X	X	X	X	X	X			X																				
29		X	X	X	X	X		X	X	X			X	X																				
30	X	X	X	X	X	X		X	X		X																							
31			X	X	X	X	X	X	X	X	X	X	X																						
35	X		X			X																												
36	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X																	
37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																			
38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X																	
39	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X																	
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																			
41	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X																	
42	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X																	
43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X																	
44	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X								X					
45		X	X	X	X	X	X	X	X	X	X	X	X	X																					
45a	X	X															X																	
46	X	X	X	X	X	X	X	X	X	X							X																	
47	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X									(x)					
48	X	X	X	X	X	X		X	X	X	X		X				X																	
49	X	X	X	X	X	X		X	X	X	X		X		X		X																	
50	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X													
51	X	X	X	X	X	X			X	X																								

„In order to find out whether or not chemical-analytical or physical methods of determination provide comparable results not only when repeated in the same laboratory but also in different laboratories, it is necessary to carry out joint studies (interlaboratory experiments). In ISO 5725, very detailed information is given on how such interlaboratory experiments are to be carried out and evaluated. A central factor in judging such a measuring method are the quantities of repeatability and reproducibility, or more precisely, repeatability standard deviation and reproducibility standard deviation. In order to prevent these quantities being distorted by the results of isolated non-representative laboratories, the ISO norm 5725 suggests conducting outlier tests before the final evaluation. Robust statistical methods allow us to circumvent outlier tests.

The important thing about these robust methods is that a different measure is used for variability then empirical variance. There are different reasons that suggest such a method.

On the one hand, no systematic error should be committed with data that have exactly normal distribution. Yet this is not the case for the ISO norm (and with other methods using outlier tests). If such a test operates with a probability for error of 5%, then in one case out of twenty on average one laboratory will be eliminated, even if its results are completely correct. Since several such tests are carried out in an interlaboratory experiment, these probabilities for error accumulate. Rejection measurement values with large residues (difference between estimated and measured quantities) results in the variance components systematically coming out too small and in methods being considered more precise then they actually are.
On the other hand, results deviating too strongly from the great majority should not be weighted or should only be weighted with a very little weight so that final result is not distorted.

...

In general, the characteristic quantities calculated according to different methods do not deviate strongly from one another (as shown in table 2, ann. of the author). *Still, the robust method is preferable to the ISO norm. The absence of systematic error is important, as well as the fact that subjective decisions by the interlaboratory experiment leaders become superfluous. The problematic outlier tests can also be dispensed with. By contrast, the robust method permits a constant transition between accepting and completely rejecting doubtful measurement values."*

Fore further information please see the 'Schweizer Lebensmittelbuch' or the more specialised literature listed in chapter 2.5 (HAMPEL 1980, HAMPEL 1987, LISCHER 1987, ROCKE 1983).

The complete data are presented in the annexed on pages 3-1 and following
(state: August 1st, 1998). If single values have an enclosed 'a', 'b', or 'ab' their data are automatically 'trimmed'(the original German term is' gestutzt') by the iteration process, but, as explained in the above citation, not eliminated.
Only the data with values lower than the determination limits were not included in evaluation.

2.2 Comparability with the 2nd interlaboratory test 1995/96

As mentioned before, sample 3 (quercus ilex, Spain) of the 2nd test and sample 4 („oak, Germany") have been identical. The following **Table 2** gives a comparison of element means of 2nd and 3rd interlaboratory study.

For almost all elements we find a surprisingly high harmony among the means, even between the robust statistics and the evaluation method according to ISO 5725, which has been used in the first report to the 2nd interlaboratory test.

Only those elements, which results were criticised as 'not acceptable' like Sodium or Lead or those with larger differences between the number of participants, i.e. Boron, show small deviations in their means.

In addition to this **Figure 2** and **Figure 3** presents in comparison of the 2nd and 3rd ring test the Mandels h plot over all samples and elements. It demonstrates whether the laboratory trends towards higher or lower values than the mean of all laboratories and likewise the

extremes. 50 % of all laboratory values are to be found within the rectangular box. One can easily see, that the extremes of the two tests are very similar.

It is an important conclusion that in principle the 2nd interlaboratory needle/leaf test 1995/96 is fully comparable with the study of 1997/98.

Table 2: Mean comparison of sample 3 (2nd ring test) and sample 4 (3rd ring test)
(*n* = number of data sets)

	2nd test 1995/96			**3rd test 97/98**	
Element	**ISO 5725**	**Robust Stat.**	***n***	**Robust Stat.**	***n***
Nitrogen (mg/g)	11.61	**11.65**	*37*	**11.60**	*45*
Sulphur (mg/g)	0.95	**0.98**	*33*	**1.04**	*46*
Phosphorus (mg/g)	0.70	**0.70**	*37*	**0.69**	*50*
Calcium (mg/g)	12.59	**12.55**	*39*	**12.94**	*49*
Magnesium (mg/g)	1.31	**1.30**	*39*	**1.32**	*49*
Potassium (mg/g)	4.08	**4.07**	*39*	**4.13**	*50*
Sodium (µg/g)	76.57	**80.69**	*26*	**87.04**	*37*
Zinc (µg/g)	28.86	**28.68**	*33*	**28.04**	*45*
Manganese (µg/g)	27.57	**27.51**	*35*	**27.33**	*45*
Iron (µg/g)	305.32	**310.70**	*34*	**309.10**	*45*
Copper (µg/g)	3.85	**3.77**	*28*	**4.08**	*38*
Lead (µg/g)	1.50	**1.40**	*18*	**1.46**	*21*
Aluminium (µg/g)	434.73	**427.90**	*25*	**441.80**	*33*
Boron (µg/g)	60.82	**59.41**	*14*	**63.99**	*23*
Cadmium (ng/g)	29.73	**21.00**	*8*	**29.75**	*13*
Carbon (%)	48.83	**48.87**	*6*	**49.23**	*17*

Figure 2: Mandels h plot for 2nd ring test 1995/96

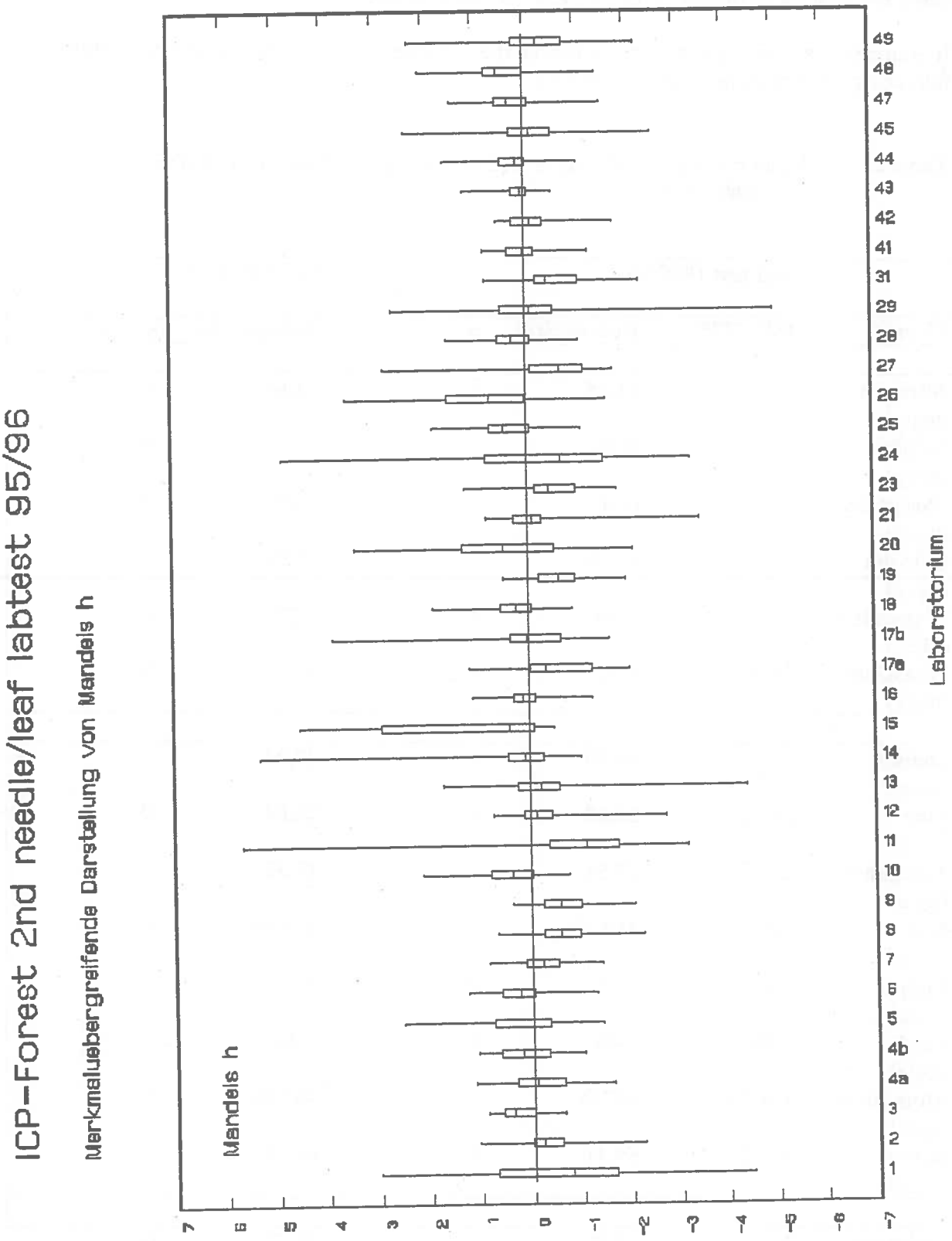
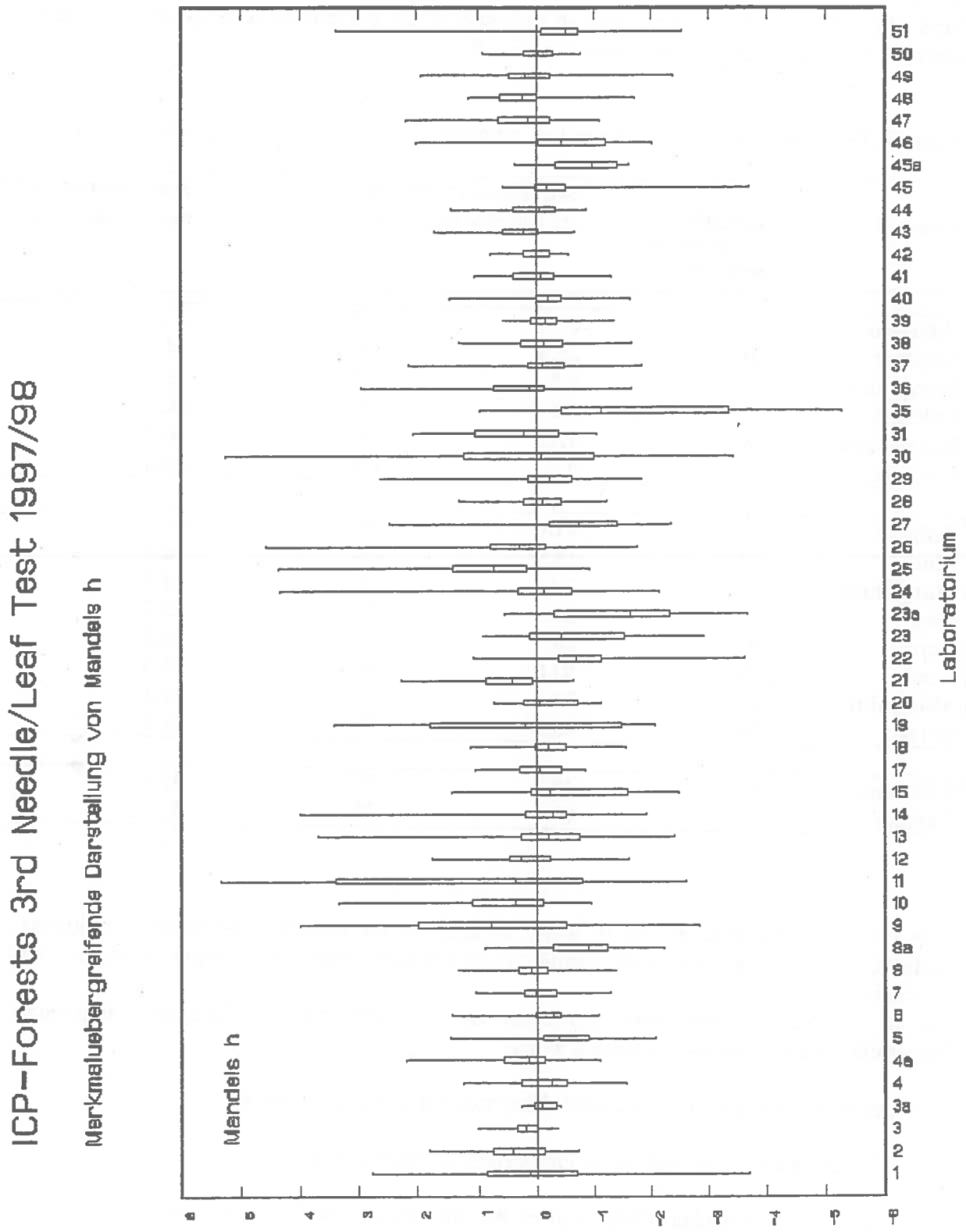


Figure 3: Mandels h plot for 3rd ring test 1997/98



2.3 Data Evaluation

The agreements of As (1994) and Vienna (1997) say that the ring tests should be evaluated on hand of fixed limits. **Table 3** presents an overview of the percentage of non-tolerable values, based on the original data given in **annex** pp 3-1 ff.

Table 3: Percentage of non tolerable values; comparison of 2nd and 3rd ring test

Element	Tolerable deviation from mean (±%)	2nd. Labtest 1995/96 non tolerable (%)	*n*	3rd. Labtest 1997/98 non tolerable (%)	*n*
Nitrogen	15	**2.7**	*148*	**4.4**	*225*
Sulphur	20	**25.8**	*132*	**14.3**	*230*
Phosphorus	15	**6.8**	*148*	**19.6**	*250*
Calcium	15	**9.6**	*156*	**16.3**	*245*
Magnesium	15	**12.2**	*156*	**16.7**	*245*
Potassium	15	**7.7**	*156*	**20.4**	*250*
Sodium	30	**61.0**	*84*	**46.6**	*178*
Zinc	20	**18.9**	*132*	**16.9**	*225*
Manganese	20	**3.6**	*139*	**10.9**	*229*
Iron	20	**20.6**	*136*	**23.7**	*224*
Copper	30	**20.7**	*116*	**16.2**	*191*
Lead	30	**53.0**	*66*	**42.4**	*99*
Aluminium	20	**32.3**	*99*	**31.1**	*164*
Boron	20	**33.9**	*56*	**18.2**	*115*
Cadmium	30	**48**	*25*	**39.0**	*77*
Carbon	10	**0**	*24*	**0**	*85*

This survey shows better results (= lower spread) for the running test mainly for Sulphur, Sodium, Copper, Lead, Boron and Cadmium and constant results for Nitrogen, Zinc, Iron and Aluminium.
But it is frightening that some mandatory elements (Phosphorus, Calcium, Magnesium, Potassium) and Manganese are getting worse.

The reasons for that are to be discussed. They may for instance be due to

1. new participants with lower experiences in plant analysis
2. only a few number of laboratories, but with many analytical problems
3. Insufficient homogeneity of the samples
4. Election of doubtful or non comparable analytical methods

Tables 4 and 5 give a short survey about the laboratories with 'values out of tolerance' in 2nd or 3rd needle/leaf interlaboratory study. The new laboratories (3a, 22, 35, 37-40, 47, 50, 51) have on an average no more 'outlier' than the most of the 'classic' laboratories. But this is not the place to censure single laboratories. Each laboratory is appealed to critiqued itself and to improve its own methods, equipment and the personal training.

Table 4:

ICP-Forests 2nd needle/leaf laboratory intercomparision 1995/96

Problematic parameters/Laboratories with values out of tolerance (4 samples)

Values out of tolerance

< value low
> value high
* values all o.k.

Nr.	N	S	P	Ca	Mg	K	Na	Zn	Mn	Fe	Cu	Pb	Al	B	Cd	C
1	*	>	*	>>	<<<<	*		<<<	>	<<<<						
2	*	*	*	*	*	*	<<	*	*	*	>>		<<	>		
3	*	*	*	*	*	*		*	*	*		*				
3a																
4	*	*	*	*	*	*		*	*	<	*	*				*
4a	*	*	*	*	*	*	<<<<	*	*	*	*	<<<	*			*
5	*	<<<<	*	*	>>>	*	*	*	*	*						
6	*	*	*	*	*	>>	<<	*	*	*	*	*	>>	>		*
7	*	*	*	*	*	*	<<	*	*	*	*		<	*		
8																
8a	*	*	*	*	*	*	<<<	*	*	<<<<	*				<	
9	*	<<	*	<<<	*	*	>>>	*	<	<	<	*	<<	<		
10	*	>	*	>	*	*	>>	*	*	>	>>		>>>			
11	*	<<<<	<<	<<	>>>>	*										
12	*		<<	*	*	*	<		<	*			*			
13	*	*	*	*	*	*		*	<<<		*	>>	<		>>	
14	>>>	*	*	*	*	*	<<		*	*			>	*	<	
15	*	*	>>>>	>>>>	*	*										
16	*	>	*	*	*	*		*	*	<	*		*			
17b	*	<<	*	*	*	>	<<<<	*	*	*	*	<	*			
18	*	*	*	*	*	*	>>>>	>>	*	*	*			*		
19	*	*	*	*	*	<<										
20	*	*	*	<<<	*	*		>>>>	*	>	>>>					*
21	*		*	*	*	*		<<	*	<<<<	*			*		
22																
23	*	*			*	*										
23a			*	*	<	*									>>>>	
24	*	>>>>	*	*	*	<<<	>>>>	<	*	>	<<<	<<		<<<<		
25	*	>>>>	*	*	*	*	>>>>	*	*	>	*		*	*		
26	*	>>	*	*	>>>	*	>>>	>	*	<>	>>>>	<	>>>	>>>		
27	>		*	*	<<<	*	<<	<<	*	<<	<	>>>				
28	*		*	*	*	*	<	*	*	<>	>>			>		
29	*	<<		*	*	*		*	*	*			>>>>			
30																
31	*			*	*	<<<<	<	<<<<	*	<<	*	<<<	*			
35																
36																
37																
38																
39																
40																
41	*	*	*	*	*	*	<	*	*	*	*	>	*			
42	*	*	*	*	*	*	*	*	*	*	<<	<<	<	*		
43	*	*	*	*	*	*	>>	*	*	*	>	>>>	*	>	>	
44	*	*	*	*	*	*	>>	*	*	>	*	>>	*		<	*
45	*	*	*	*	*	*	*	*	*	*	>	>>>>	*	<<<<	<<	*
45a																
46																
47	*	*	*	*	*	*	>>	*	*	*	*	<<<<	*			
48	*	*	*	*	*	*		*	*	*	*		<			
49	*	*	*	*	*	*		*	*	*	<		<<<			
50																
51																

The assumption, that only a few number of laboratories with large analytical problem would cause the deterioration especially for P, Ca, Mg and K, is partly correct. As shown in **Table 5** there are only a handful of laboratories with four or five values out of tolerance for each element, most of them with a uniform tendency, too high or too low. For Phosphorus, Calcium and Magnesium there are only 7 laboratories, for potassium 8 laboratories. On the other side we find some laboratories with serious deviations for most elements. This is astonishing, because some of them have had very positive results during the second ring test.

Table 5:

ICP-Forests 3rd.needle/leaf laboratory intercomparision 1997/98

Problematic parameters/Laboratories with values out of tolerance (5 samples)

Values out of tolerance

< value low
> value high
* values all o.k.

Nr.	N	S	P	Ca	Mg	K	Na	Zn	Mn	Fe	Cu	Pb	Al	B	Cd	C
1	*	<>	>>>	>>>>	*	>		<<<<<	*							
2	*	*	>>>>	*	>	*	*	*	*	*	*		*	>>>>		
3	*	*	*	*	*	*		*	*	*						
3a		*														
4	*	*	*	*	*	*	>>>>	*	*	<<<	*	*	<>	*	<	*
4a		*	*	*	*	*	>>>>>	*	*	>	>	<	>>>			
5	*	<<	<<<	<	*	>>>>	<<<	*	*	*	*					
6	*	*	*	*	*	*		*	*	*	*		*	*		
7	*	*	*	*	*	*	<<<	*	*	*	<		*	*		*
8	*	*	*	*	*	>	>>>>	*	<	*	>					
8a	*	<<<<<	*	<<	<	*	>>>>	<<<	<<<	<<<<<	*	*	<			
9	*	*	<<<<<	>>>	*	<<<<<	>>>>>	>>>>>	<	*	>>>>>	>>>>>	>>		>>>>	
10	*	>	*	>>>	>	*		*	<	*	>>>>		>>>>	>>>		
11	*	>>>>>	*	*	>>>>>	<										
12	*	*	*	*	*	*	*	*	*	*	<<		>			*
13	*		<	<	*	*	>	*	>>>>	<	>>	>>>>	<<<		<>	
14	*	*	*	>>>>	*	>>>>>	<	*	*	*	<<<	<<<	*	*	*	
15	*		<<<<<	>	<<<<<	*										
16																
17	*	*	*	*	*	*	<>	*	*	*	*	*	*		*	
18	*	*	*	*	*	*	<>	<	*	<	*		*	>>		
19	*	>	<<<<	>>>>	>>>>>	*										
20	*	*	*	*		*		<	*	*						
21	*	*	>	*	*	*	>>>	>	*	*	*			*		
22	*	<	<	*	*	<<	<<	<<<	>	<<<<			<<<<			*
23	*	*	>	*	<<<	<<<<<	*	<<<<<	<<<	<<<<<	*		<<	<		
23a			*	<<<<	<<<<	<<<<<	<>	<<<<<	<<<<	<<<<<	<<		<<<<	*		
24	*	>	*	*	*	<	>>>>	<	<<	*	>>	<>>>>		>>>	<>	*
25	>	*	*	>>>>	>>>>>	>>	>>>	>>	>	>>>	*	>>>>	>>>>>	>	>>>>	
26		>>>>	>>>>>	*		>	>>>>>	>	*	*	*	>	<	>	<<<	
27	*		*	<<<<<	<<<<<	<<<<<	<<<	*	*	<<<<	>>					
28	*	*	<	*	>>	*	<<<	*		<	*			*		
29		*	<	*	*	*		*	<	<<<<			<>	*		
30	<<>	>>>>>	*	<	>>	<<<<<	>>>>	>>>>>	<<		>>	<				
31			>>>>>	*	*	*	*	*	*	>>>	*	<<<	*			
35	<<<<		*			<<										
36	>	*	>>>	<<<	>	*	<	*	*	*	*	>>>>		*	>>>>	*
37	*	>>	>	*	*	<	<<<	*	*	*	<	<<<<	*	*	<<	
38	*	*	*	*	*	*	*	*	*	>>>	*	<<<	>	<	<<	*
39	*	*	*	*	*	*	>	*	*	*	*	<	*		*	*
40	*	*	*	*	*	*	*	*	*	*	*	*	<>>	*	<	
41	*	*	*	*	*	*	>>	>>>>>	<	*	*	*	<		*	*
42	*	*	*	*	*	*	*	*	*	*	*	*		*		*
43	*	*	*	*	*	*	>	*	*	>>	*	<<	>	*	<>	*
44	*	*	*	*	*	*	*	*	*	*	*	<	*		<>	*
45		*	*	*	*	*	<<<	*	*	*	*		<<<	<<<<<		
45a	*	<<														*
46	*	*	<<<<<	*	>	<<<<<	<<<	*	*	>>>>						*
47	*	*	*	*	*		<<	*	<	*	*	<<	>>>		*	*
48	*	*	*	*	*	*		*	*	*	*		<<			*
49	*	>	*	*	*	>		*	*	*	<<<		<<		*	*
50	*	*	*	*	*	*	<<<	*	*	*	*	*	*	*		
51	*	*	*	*	*	*			>	<<>						

Otherwise we have a lot of laboratories with no or only a few share of outliers, especially Labs 3, 6, 7, 12, 17, 18, 20, 21, 39, 40, 42, 44, 48, 50. **Table 6** account those laboratories whose values are situated within tolerable limits during both ringtests. Their methods and experiences might be most useful in to revise the manual.

Table 6:

ICP-Forests 3rd.needle/leaf laboratory intercomparision 1995/96 and 1997/98

Laboratories without any 'outlier' during both interlabortory studies : #

Nr.	N	S	P	Ca	Mg	K	Na	Zn	Mn	Fe	Cu	Pb	Al	B	Cd	C
1	#															
2	#	#		#		#		#	#	#						
3	#	#	#	#	#	#		#	#	#		#				
3a																
4	#	#	#	#	#	#		#	#		#	#				#
4a		#	#	#	#	#		#	#							
5	#							#	#	#						
6	#	#	#	#	#			#	#	#						
7	#	#	#	#	#	#		#	#	#						
8																
8a	#		#								#					
9	#				#											
10	#		#			#		#								
11	#															
12	#			#	#	#				#						
13	#				#	#		#								
14		#	#		#				#	#				#		
15						#										
16																
17	#		#	#	#			#	#	#	#		#			
18	#	#	#	#	#	#			#		#					
19	#															
20	#	#	#			#			#							
21	#			#	#	#			#		#			#		
22																
23		#														
23a			#													
24	#		#	#	#											
25				#					#							
26			#						#							
27			#						#							
28				#		#		#	#							
29				#	#	#		#								
30																
31				#	#				#		#		#			
35																
36																
37																
38																
39																
40																
41	#	#	#	#	#	#				#	#					
42	#	#	#	#	#	#	#	#	#	#				#		
43	#	#	#	#	#	#		#	#							
44	#	#	#	#	#	#		#	#		#		#			#
45	#	#	#	#	#	#		#	#	#						
46																
47	#	#	#	#	#			#		#	#					
48	#	#	#	#	#	#		#	#	#	#					
49	#		#	#	#			#	#	#						
50																
51																

Thesis 3 - poor homogeneity of the samples - is also to neglect. As stated before, sample 3 (2nd test) and sample 4 (3rd test) have been identical. For the other samples the preparation was identical to 1995 and the variances (interlab and intralab) do not change very much between 2nd and 3rd ring test (**Figure 4, 5**). In contrast, they seem to be better in the 3rd test.

Figure 4: Comprehensive survey of interlab variances (2nd ring test 95/96)

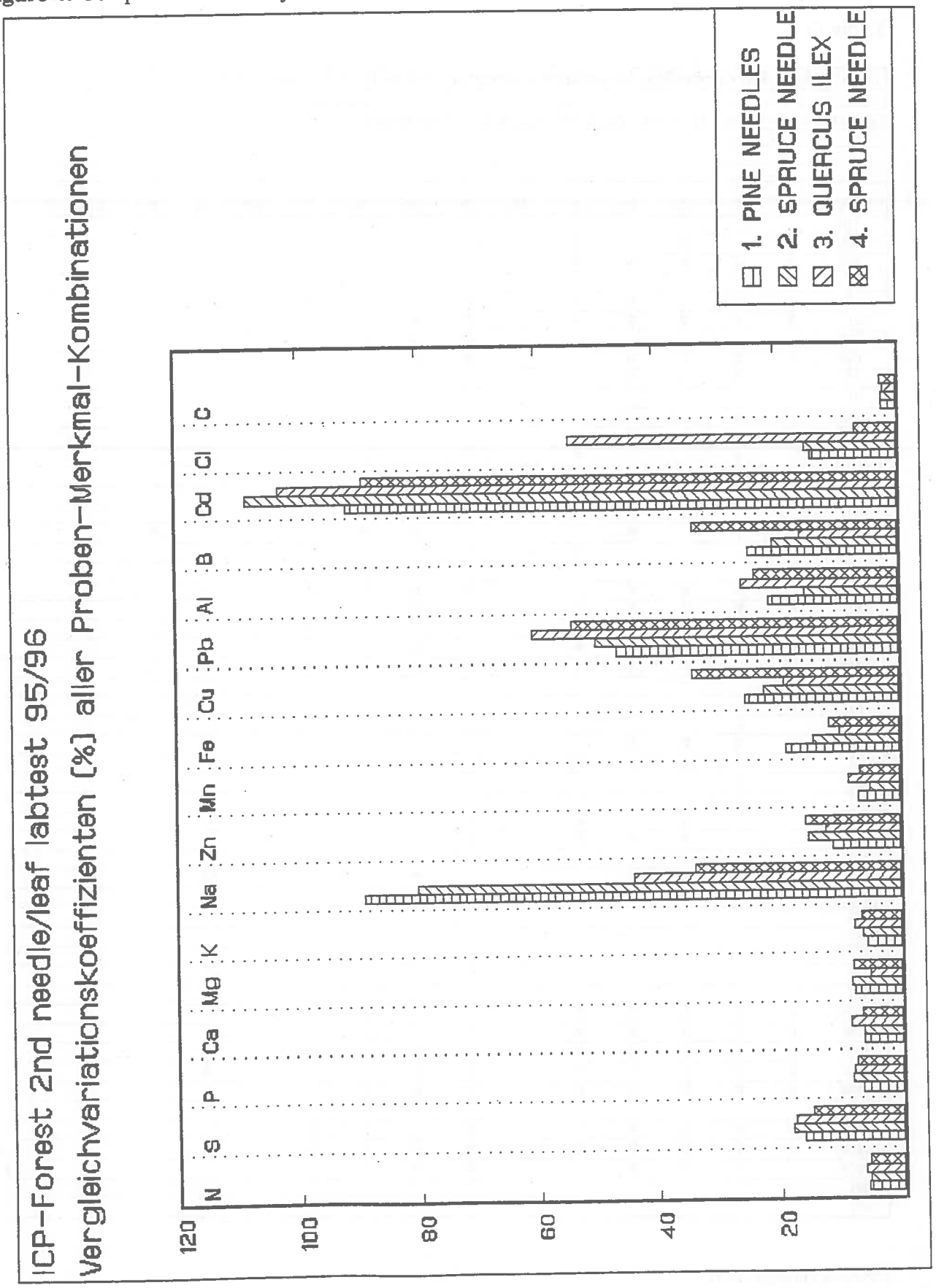


Figure 5: Comprehensive survey of interlab variances (3rd ring test 97/98)

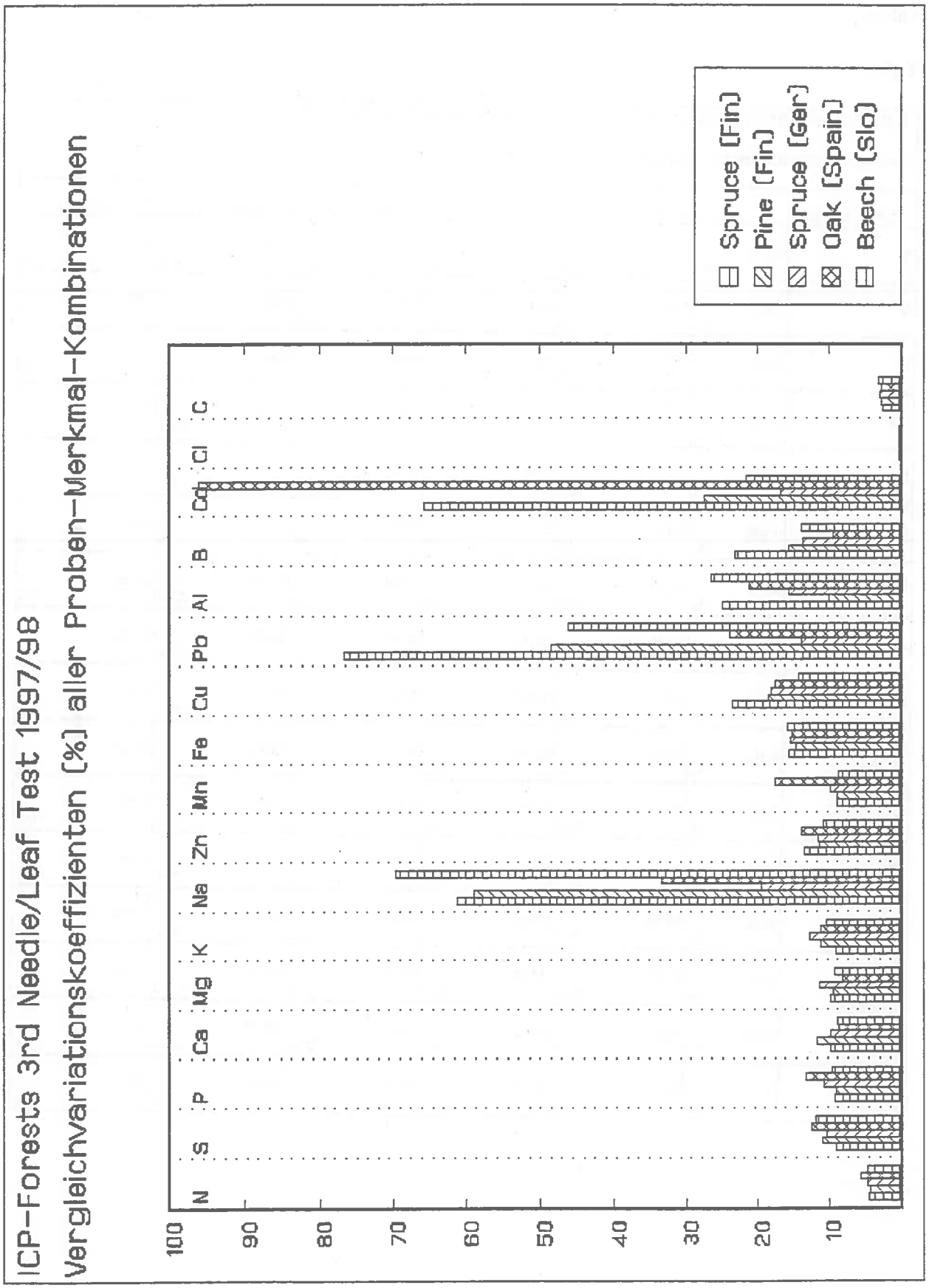


Table 7 demonstrates that numerous values out of tolerance depend of element contents in the foliar samples. Lower element contents cause in most cases higher numbers of intolerable values.

Table 7:

ICP-Forests 3rd.needle/leaf laboratory intercomparision 1997/98

Element contents (mean) and percentage of values out of tolerance (%)

Elem./Sample		1 Spruce (Fin)	2 Pine (Fin)	3 Spruce (Ger)	Oak (Spain)	Beach (Slov)
N	mg/g	11.74	11.77	14.36	11.6	20.2
	%	2.2	4.4	6.7	4.4	4.4
S	mg/g	0.91	0.86	1.57	1.04	1.87
	%	10.9	19.6	10.9	13	17.4
P	mg/g	1.56	1.39	1.06	0.69	1.16
	%	20	14	18	30	16
Ca	mg/g	3.55	2.46	4.95	12.94	7.25
	%	20.4	20,4	16.3	12.2	12.2
Mg	mg/g	1.33	1.04	0.59	1.32	1.02
	%	18.4	18.4	20.4	12.2	14.3
K	mg/g	5.18	5.12	5.28	4.13	6.8
	%	22	22	18	22	18
Na	µg/g	35.13	34.27	179.4	87.04	30.55
	%	68.6	60	18.9	32.4	55.9
Zn	µg/g	24.75	42.12	43.86	28.04	27.54
	%	20	15.6	13.3	17.8	17.8
Mn	µg/g	338.2	323.4	1347	27.33	1328
	%	6.5	6.5	8.7	22.2	10.8
Fe	µg/g	45.45	69.38	157.5	309.1	70.29
	%	24.4	24.4	22.2	20	27.3
Cu	µg/g	2.65	3.52	3.67	4.08	5.88
	%	26.3	18.4	15.8	10.5	10.3
Pb	µg/g	0.4	0.61	4.89	1.46	0.96
	%	61.1	52.6	13.6	28.6	63.2
Al	µg/g	50.74	293.2	141.8	441.8	60.04
	%	37.5	6.1	27.3	39.4	33
B	µg/g	8.58	11.82	23.61	63.99	17.52
	%	34.8	17.4	17.4	4.3	17.4
Cd	ng/g	36.6	130.3	435.6	29.75	200.7
	%	61.5	23.5	23.5	84.6	17.6
C	%	50.96	51.89	49.44	49.23	48.99
	%	0	0	0	0	0

2.4 Evaluation by analysis methods

This part will discuss in detail the problems of used pretreatment and measurement methods. The evaluation by methods is based on the following informations for each element:

a) Elementspecific code index according to the used methods

b) Graphic presentations of data arranged acc. method codes

> The graph shows the plus/minus deviations of methods for each element from mean based on the robust evaluated data (annex) and arranged by ascending pretreatment methods. Each stick represents one of the 5 samples. The broken lines define the tolerable limits (see table 3).

c) Graphic presentations of data arranged acc. determination codes

d) Original laboratory data of annex on pp 3-1.

This chapter gives proposals for the manual revision. It bases on so-called 'robust methods.' These are the fatty printed actual methods of those laboratories whose data have completely been free of 'outliers' during the last two interlaboratory studies (compare **Table 6)**.

„PN" means pretreatment method, „DN" means determination method

2.4.1 Nitrogen

A slight tendency to lower results by Kjeldahl digestion can be stated. But because we recognise only a few 'outliers' this seems to be no problematic point. Only the method combination 8.4-14 lead to not tolerable minor values.
In comparison to the 2nd ring test it is striking that the use of classic Kjeldahl methods is reduced in favour of the several elementaranalysator types. It can be expected that this process will proceed in future.

Proposal for the manual revision:

Nessler-Method is not used any longer and can be cancelled.

Decrease of the tolerable deviation from mean further interlaboratory studies from ±15 to ±10 percent.

Preferred methods:

Lab Nr.	PN	DN
12	1	10
49	1	10
4	1	10.1
6	1	10.2
3	1	13
19	1	13
20	1	13
21	1	13
42	1	13
44	1	13
45	1	13
48	1	13
47	1	15
41	1	15.1
7	2	13
18	3.8	52
10	8	70
17	8.1	50
1	8.1	70
5	8.1	70
11	8.1	70
43	8.1	70
8a	8.2	14
9	8.2	14.1
13	8.2	70
24	8.5	14.1
2	8.5	51.1

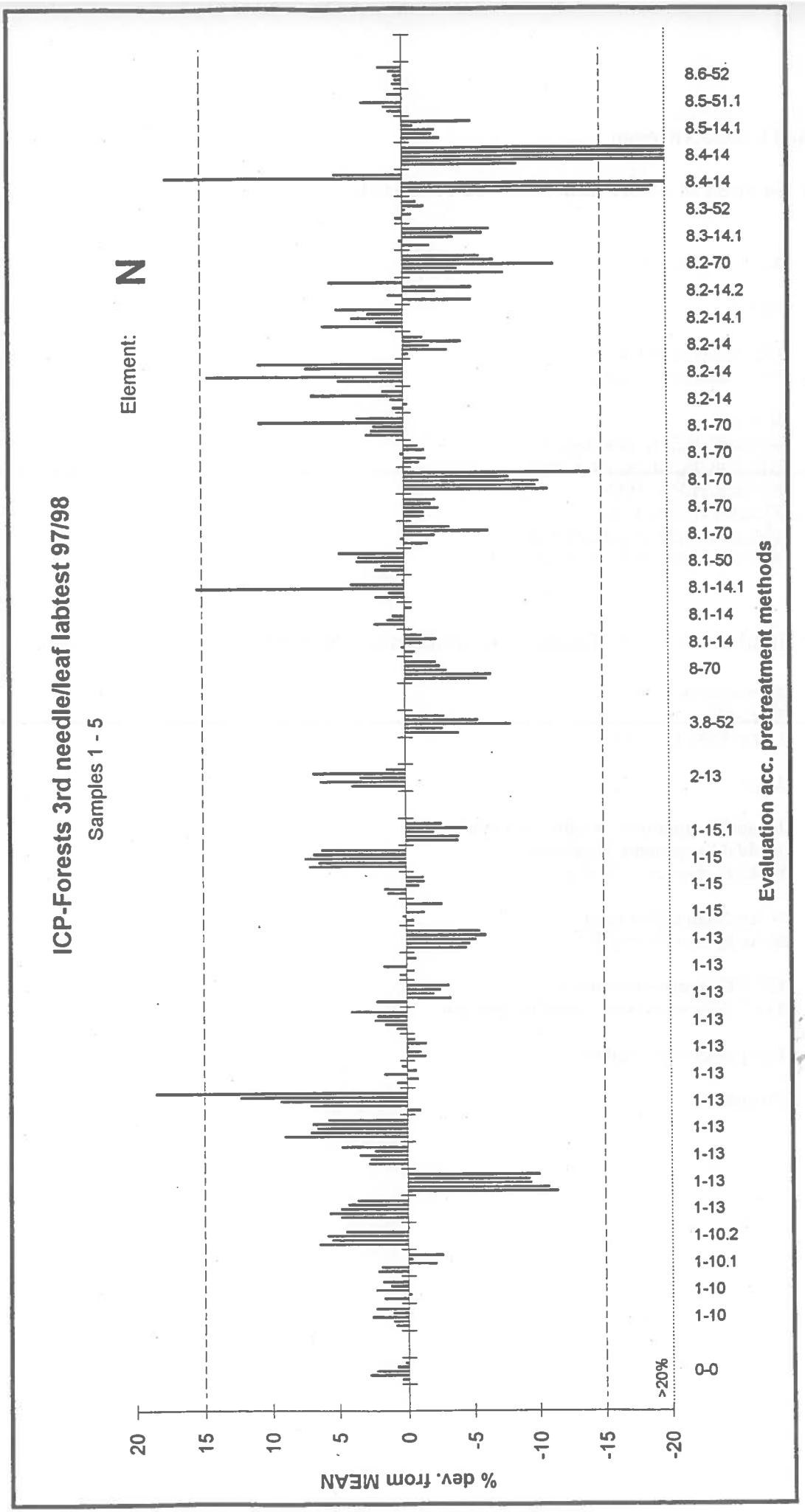
Method Codes-Nitrogen

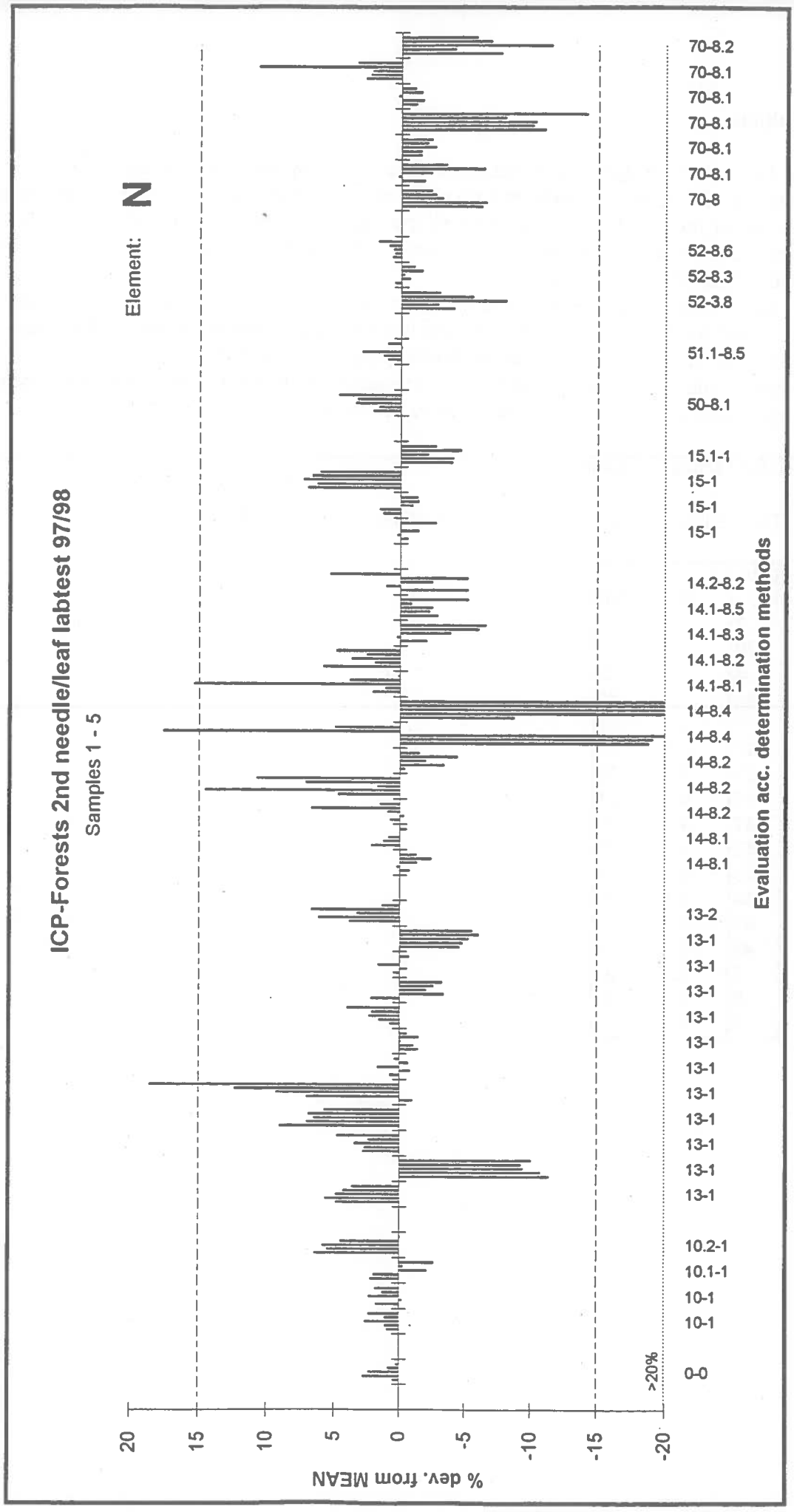
Code Numbers of Abbreviations of Pretreatments

1	**No pretreatment**
2	**Pellet**
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.8	**Wet ashing, H_2SO_4/H_2O_2**
8	**Kjeldahl**
8.1	**Kjeldahl, H_2SO_4/ Se-catalyst**
8.2	**Kjeldahl, $H_2SO_4/K_2SO_4/CuSO_4$**
8.3	Kjeldahl, H_2SO_4/ H_2O_2
8.4	Kjeldahl. $H_2SO_4/HClO_4$
8.5	**Kjeldahl, H_2SO_4/Kjeltab (TiO_2)**
8.6	Kjeldahl, H_2SO_4/Pellet(K_2SO_4/Se), H_2O_2

Code Numbers of Abbreviations of Determination Methods

10	**Elemental-analyzer**
10.1	**Eltra-M**
10.2	**Carlo-Erba EN 1500**
13	**Leco**
14	**Kjeldahl-apparatus , Kjeltec (Tecator)**
14.1	**Kjeldahl-apparatus, (Gerhardt)**
14.2	Kjeldahl-apparatus, (Büchi)
15	**N-Analysator (Heraeus)**
15.1	**N-Analysator (Vario EL)**
50	**UV-VIS spectrophotometry**
51.1	**FIAS, NH_3-Membrane-diffusion, 566 nm**
52	**Indophenol-blue-method**
70	**Titration**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: N
% dev. from MEAN
20
15
10
5
0
-5
-10
-15
-20
>20%
Evaluation acc. pretreatment methods
8.6-52
8.5-51.1
8.5-14.1
8.4-14
8.4-14
8.3-52
8.3-14.1
8.2-70
8.2-14.2
8.2-14.1
8.2-14
8.2-14
8.2-14
8.1-70
8.1-70
8.1-70
8.1-70
8.1-70
8.1-50
8.1-14.1
8.1-14
8.1-14
8-70
3.8-52
2-13
1-15.1
1-15
1-15
1-15
1-13
1-13
1-13
1-13
1-13
1-13
1-13
1-13
1-13
1-13
1-13
1-10.2
1-10.1
1-10
1-10
0-0


ICP-Forests 2nd needle/leaf labtest 97/98
Samples 1 - 5
Element: N
% dev. from MEAN
20
15
10
5
0
-5
-10
-15
-20
>20%
Evaluation acc. determination methods
70-8.2
70-8.1
70-8.1
70-8.1
70-8.1
70-8.1
70-8
52-8.6
52-8.3
52-3.8
51.1-8.5
50-8.1
15.1-1
15-1
15-1
15-1
14.2-8.2
14.1-8.5
14.1-8.3
14.1-8.2
14.1-8.1
14-8.4
14-8.4
14-8.2
14-8.2
14-8.2
14-8.1
14-8.1
13-2
13-1
13-1
13-1
13-1
13-1
13-1
13-1
13-1
13-1
13-1
13-1
10.2-1
10.1-1
10-1
10-1
0-0

2.4.2 Sulphur

We see two trends. Sulphur is increasingly determined by elemental analyzator and, more important, by ICP. Classical methods with much manual effort like Schöniger ashing/titration are not used anymore and dry ashing methods are only used by a minority of participants. We find heavy positive outliers for the combination 3.3-50 and the exclusion of this method is to be considered for manual revision.
On the other hand we find very good and homogeneous results for all combinations with pressure digestion digestion/ICP. This method is surely one of the preferred in the future. No problems are to be stated for X-ray methods after pelleting the foliar.
The elemental-analysator-methods and microwave-ashing/ICP seem to be ununiform. Probably due to apparatus-handling we find kicks to more or minor values.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PS	DS
3	1	13
20	1	13
4	2	40
4a	2	41
7	3.2	31
45	3.3	31
23	3.3	50
14	4.1	31
41	4.1	31
42	4.1	31
43	4.1	31
44	4.1	31
47	4.1	31
48	4.1	31
2	5.2	31
18	5.4	31
6	5.6	31

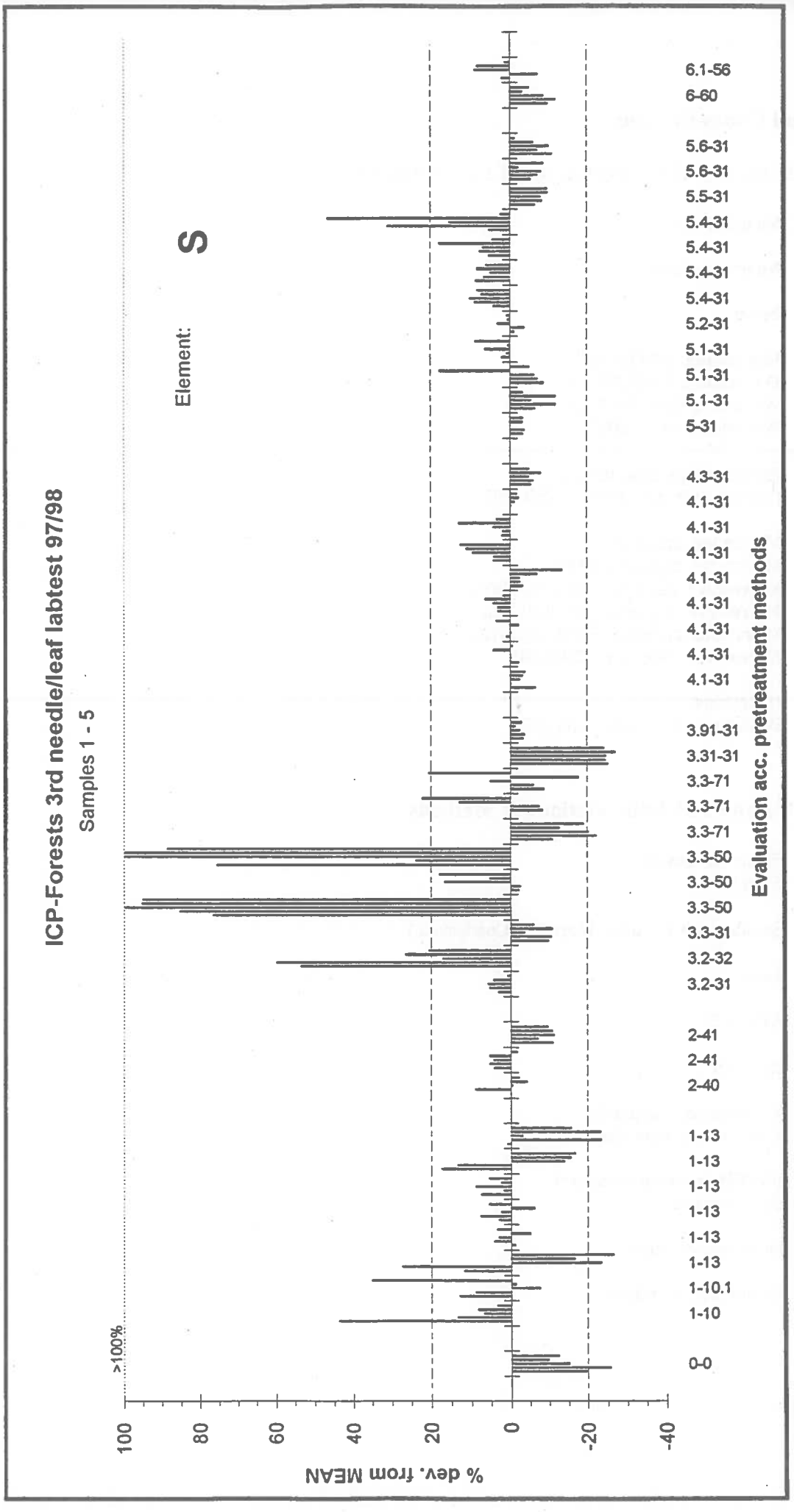
Method Codes-Sulphur

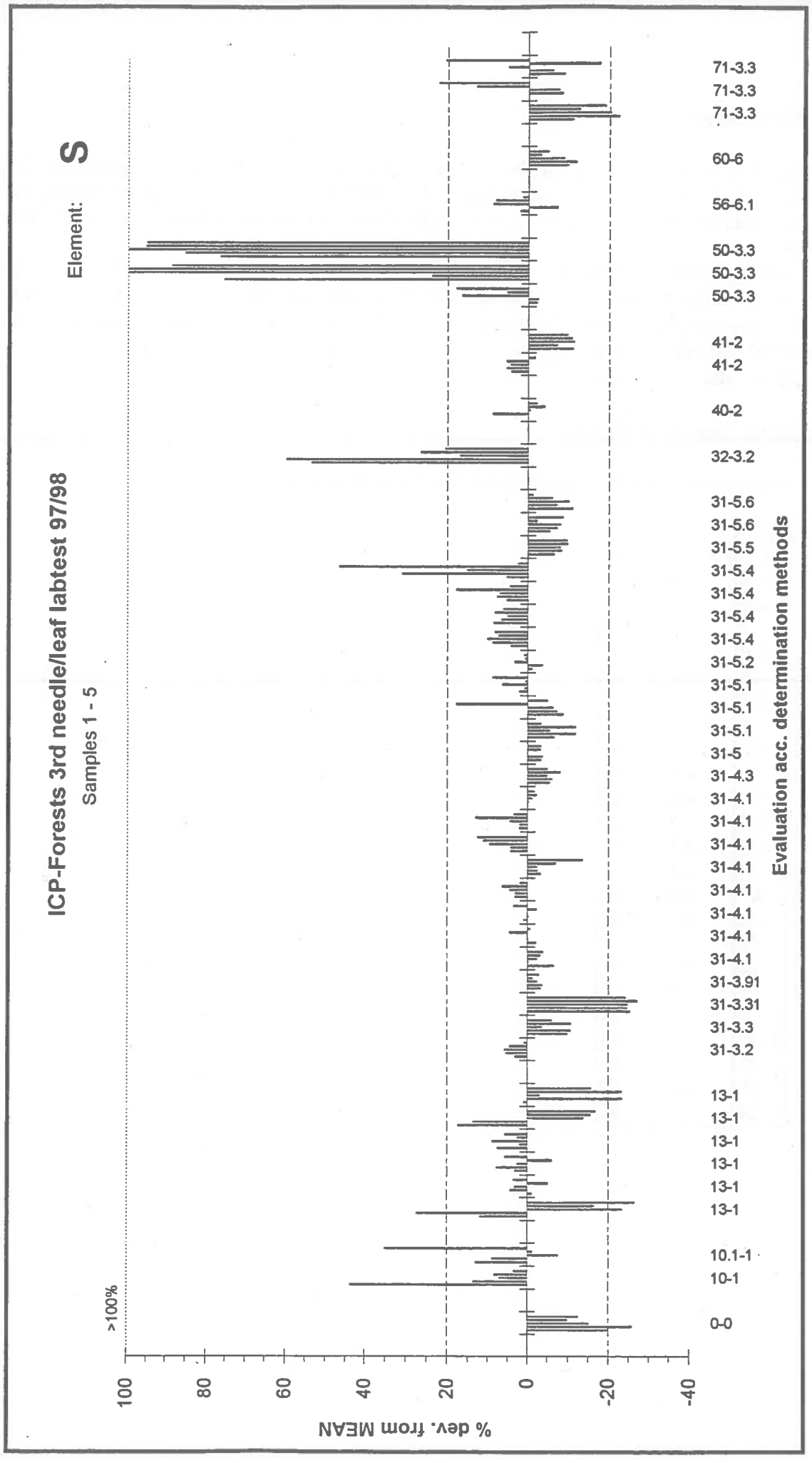
Code Numbers of Abbreviations of Pretreatments

0	No information
1	**No pretreatment**
2	**Pellet**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5	Microwave digestion
5.1	Microwave digestion, HNO_3,
5.2	**Microwave digestion, $HCLO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	**Microwave digestion, HNO_3/HF**
6	Dry ashing
6.1	Dry ashing, dissolution with HCl

Code Numbers of Abbreviations of Methods

10	Elemental-analyzer
10.1	Eltra-M
11	Sulmhomath 12 ADG, Woesthof (Conductom.)
13	**Leco**
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**
50	**UV-VIS spectrophotometry**
56	$BaCl_2$-method
60	Ion-chromatography
71	Turbidimetric titration


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: S
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
Evaluation acc. pretreatment methods
6.1-56
6-60
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5-31
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
3.91-31
3.31-31
3.3-71
3.3-71
3.3-71
3.3-50
3.3-50
3.3-50
3.3-31
3.2-32
3.2-31
2-41
2-41
2-40
1-13
1-13
1-13
1-13
1-13
1-13
1-10.1
1-10
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: S
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
Evaluation acc. determination methods
71-3.3
71-3.3
71-3.3
60-6
56-6.1
50-3.3
50-3.3
50-3.3
41-2
41-2
40-2
32-3.2
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.31
31-3.3
31-3.2
13-1
13-1
13-1
13-1
13-1
13-1
10.1-1
10-1
0-0

2.4.3 Phosphorus

In comparison to the 2nd ring test the analysis of Phosphorus got worse. A contamination by dishwashers may be possible in some cases. We state a descending number of laboratories using dry ashing methods combined with colorimeter and an ascending use of ICP- after digestion.
As for sulphur pressure digestion combined with ICP (4-31) leads unequivocally to the best results no or little problems can be found for X-ray-spectrometry and most classic methods with dry ashing-colorimetry. The trend of wet-digestion and microwave-digestion is not uniform and depends obviously on the handling by the laboratory.
Proposal for Manual-revision:

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PP	DP
4	2	40
4a	2	41
7	3.2	31
26	3.2	32
45	3.3	31
8a	3.31	31
3	3.7	31
18	3.8	54
14	4.1	31
41	4.1	31
42	4.1	31
43	4.1	31
44	4.1	31
47	4.1	31
48	4.1	31
49	4.1	31
20	5.1	31
17	5.4	31
6	5.6	31
23a	6.1	31
27	6.1	50
10	6.1	55
24	6.5	55

Method Codes-Phosphorus

Code Numbers of Abbreviations of Pretreatments

0 no information

2 Pellet

3.2 Wet ashing, HNO_3/H_2O_2
3.3 Wet ashing, $HNO_3/HClO_4$
3.31 Wet ashing $HNO_3/HClO_4/HF$
3.4 Wet ashing, $HNO_3/HClO_4/CaCl_2$
3.5 Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.6 Wet ashing, $H_2SO_4/HClO_4$
3.7 Wet ashing, H_2SO_4/HNO_3
3.8 Wet ashing, H_2SO_4/H_2O_2
3.91 Wet ashing, $HClO_4/H_2O_2$

4.1 Pressure digestion, HNO_3,
4.3 Pressure digestion, $HNO_3/HClO_4/HF$,
4.4 Pressure digestion, HNO_3/H_2O_2,

5.1 Microwave digestion, HNO_3,
5.2 Microwave digestion, $HCLO_4/HNO_3$,
5.4 Microwave digestion, HNO_3/H_2O_2,
5.5 Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6 Microwave digestion, HNO_3/HF

6 Dry ashing
6.1 Dry ashing, dissolution with HCl
6.2 Dry ashing, dissolution with HNO_3
6.5 Dry ashing, dissolution with HCl/HNO_3

8.3 Kjeldahl, H_2SO_4/ H_2O_2

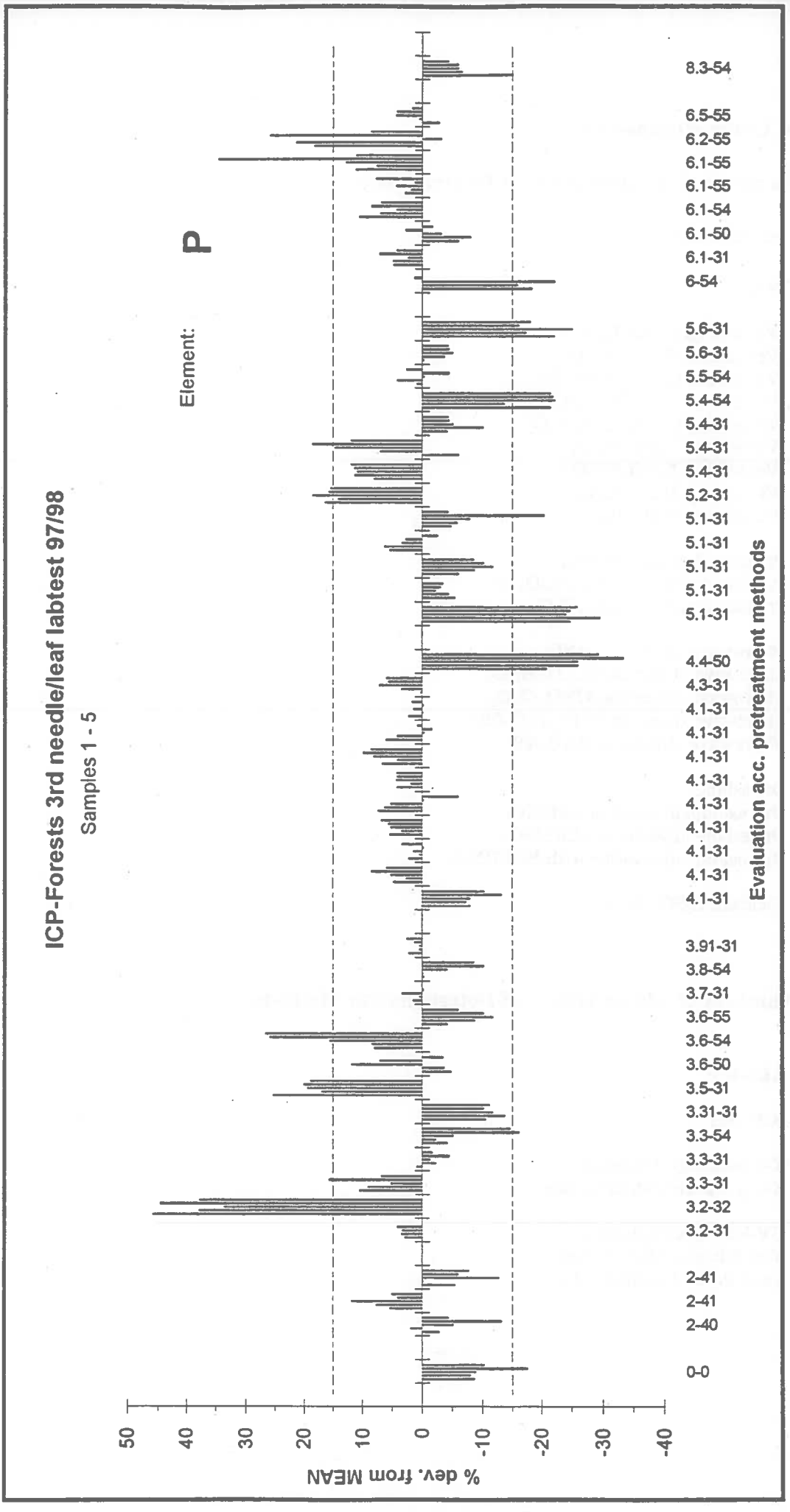
Code Numbers of Abbreviations of Determination Methods

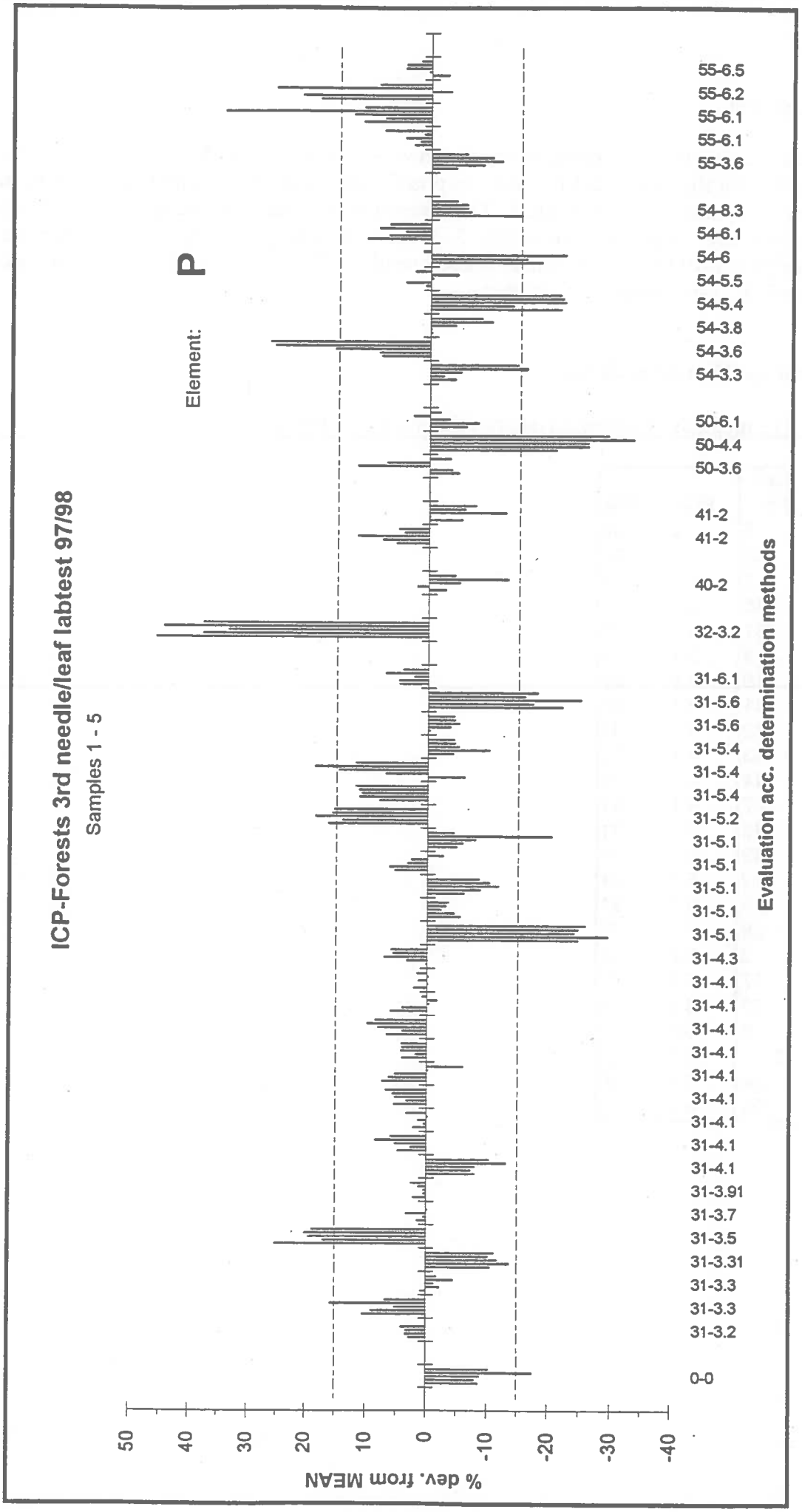
31 AES-ICP

32 ICP+MS

40 X-ray-energy dispersive
41 X-ray-wavelength dispersive

50 UV-VIS spectrophotometry
54 Molybdenum-blue-method
55 Vanadium-Mo-blue-method


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: P
% dev. from MEAN
50
40
30
20
10
0
-10
-20
-30
-40
Evaluation acc. pretreatment methods
8.3-54
6.5-55
6.2-55
6.1-55
6.1-55
6.1-54
6.1-50
6.1-31
6-54
5.6-31
5.6-31
5.5-54
5.4-54
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-31
4.4-50
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
3.91-31
3.8-54
3.7-31
3.6-55
3.6-54
3.6-50
3.5-31
3.31-31
3.3-54
3.3-31
3.3-31
3.2-32
3.2-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: P
% dev. from MEAN
50
40
30
20
10
0
-10
-20
-30
-40
Evaluation acc. determination methods
55-6.5
55-6.2
55-6.1
55-6.1
55-3.6
54-8.3
54-6.1
54-6
54-5.5
54-5.4
54-3.8
54-3.6
54-3.3
50-6.1
50-4.4
50-3.6
41-2
41-2
40-2
32-3.2
31-6.1
31-5.6
31-5.6
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.7
31-3.5
31-3.31
31-3.3
31-3.3
31-3.2
0-0

2.4.4 Calcium

As stated for the elements before, most laboratories now prefer the determination by ICP with best results. On the other hand it is very surprising that flame-AAS technique will cause many outliners with each digestion method. The determination after dry ashing and after digestion with Microwave digestion, especially 5.1) leads to ambiguous results. (But the classic combination 6.1-70 leads to surprisingly good results!) The best method seems to be pressure digestion/ICP. X-ray results are satisfying.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PCa	DCa
4	2	40
4a	2	41
7	3.2	31
45	3.3	31
31	3.5	20
3	3.7	31
18	3.8	31
41	4.1	31
42	4.1	31
43	4.1	31
44	4.1	31
47	4.1	31
48	4.1	31
49	4.1	31
12	5.1	31
25	5.1	31
29	5.1	31
2	5.2	31
17	5.4	31
21	5.4	31
6	5.6	31
23a	6.1	31
24	6.5	20
28	8.3	20

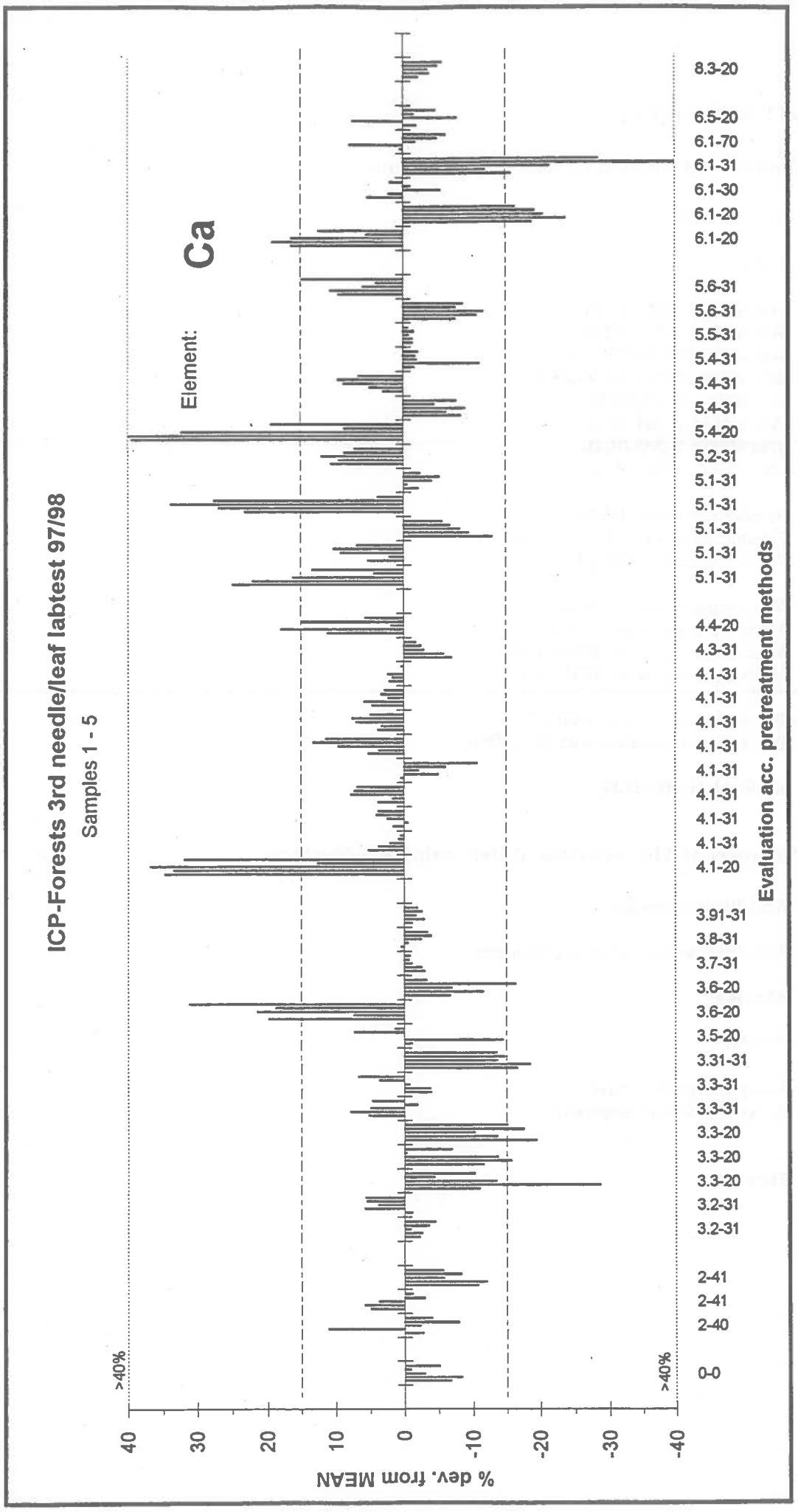
Method Codes-Calcium

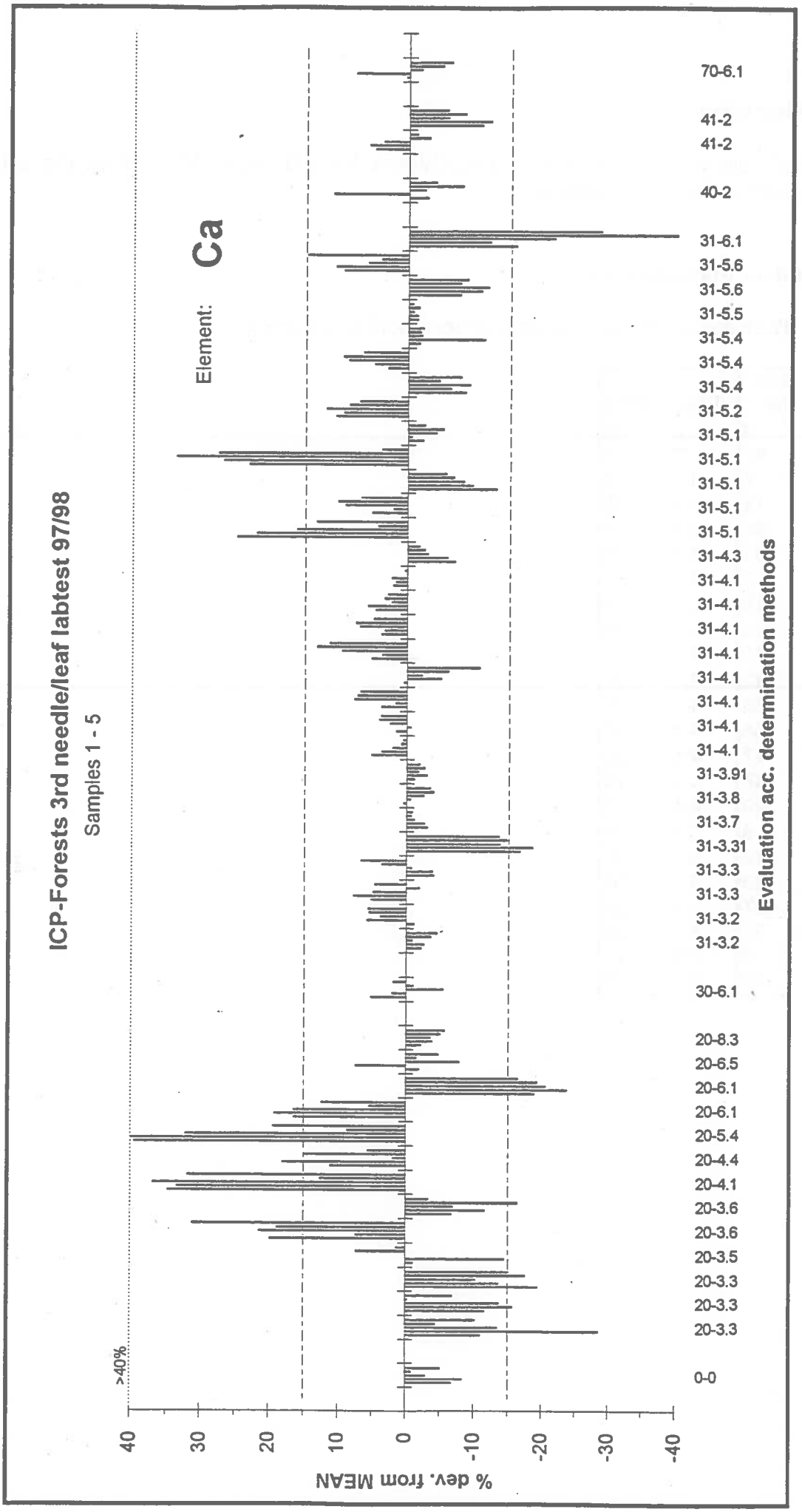
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	**Wet ashing, $HNO_3/HClO_4/H_2O_2$**
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.8	**Wet ashing, H_2SO_4/H_2O_2**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
4.4	Pressure digestion, HNO_3/H_2O_2,
5.1	**Microwave digestion, HNO_3,**
5.2	**Microwave digestion, $HClO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.6	**Microwave digestion, HNO_3/HF**
6.1	**Dry ashing, dissolution with HCl**
6.5	**Dry ashing, dissolution with HCl/HNO_3**
8.3	**Kjeldahl, H_2SO_4/ H_2O_2**

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	AES-flame technique/Flame photometer
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**
70	Titration


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Ca
% dev. from MEAN
40
30
20
10
0
-10
-20
-30
-40
>40%
>40%
Evaluation acc. pretreatment methods
8.3-20
6.5-20
6.1-70
6.1-31
6.1-30
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.4-20
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-31
4.4-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.8-31
3.7-31
3.6-20
3.6-20
3.5-20
3.31-31
3.3-31
3.3-31
3.3-20
3.3-20
3.3-20
3.2-31
3.2-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Ca
% dev. from MEAN
>40%
40
30
20
10
0
-10
-20
-30
-40
Evaluation acc. determination methods
70-6.1
41-2
41-2
40-2
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.7
31-3.31
31-3.3
31-3.3
31-3.2
31-3.2
30-6.1
20-8.3
20-6.5
20-6.1
20-6.1
20-5.4
20-4.4
20-4.1
20-3.6
20-3.6
20-3.5
20-3.3
20-3.3
20-3.3
0-0

2.4.5 Magnesium

The results are very similar to those from Calcium, but with better AAS-values. Dry ashing methods will cause some problems.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PMg	DMg
4	2	40
4a	2	41
7	3.2	31
13	3.3	20
45	3.3	31
31	3.5	20
3	3.7	31
18	3.8	31
14	4.1	20
41	4.1	31
42	4.1	31
43	4.1	31
44	4.1	31
47	4.1	31
48	4.1	31
49	4.1	31
9	5.1	31
12	5.1	31
29	5.1	31
17	5.4	31
21	5.4	31
6	5.6	31
24	6.5	20

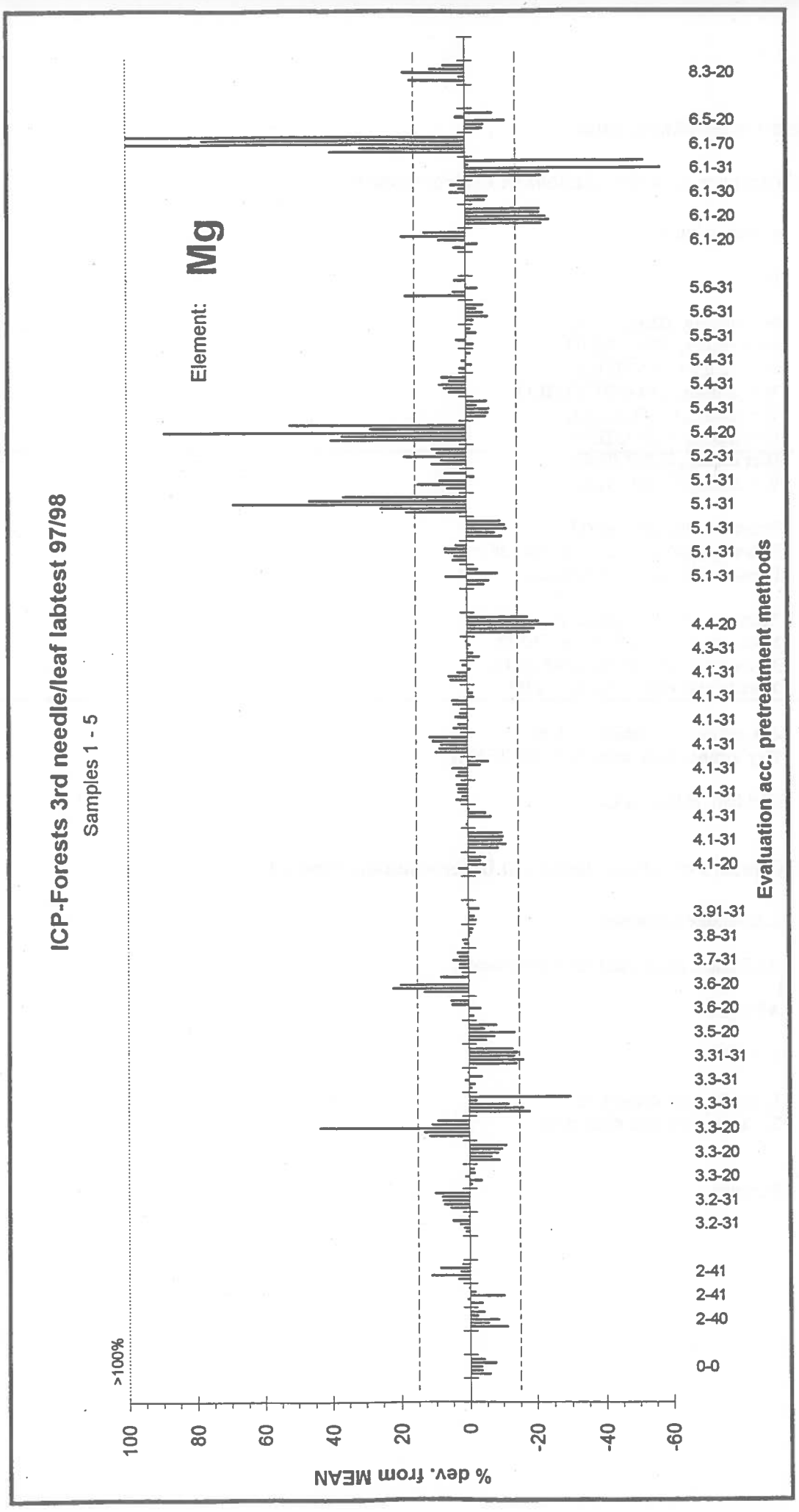
Method Codes-Magnesium

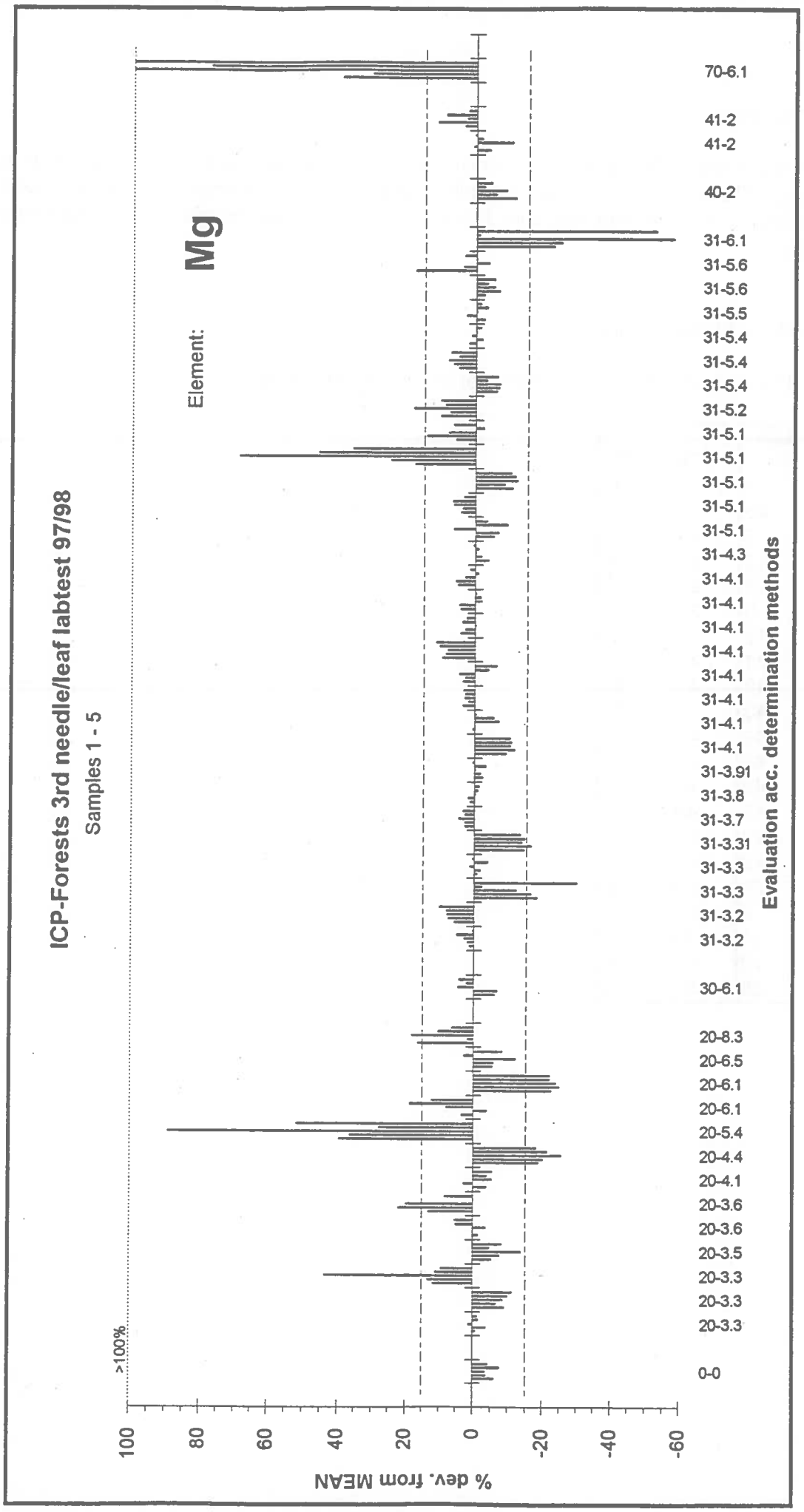
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	**Wet ashing, $HNO_3/HClO_4/H_2O_2$**
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.8	**Wet ashing, H_2SO_4/H_2O_2**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
4.4	Pressure digestion, HNO_3/H_2O_2,
5.1	**Microwave digestion, HNO_3,**
5.2	Microwave digestion, $HClO_4/HNO_3$,
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.6	**Microwave digestion, HNO_3/HF**
6.1	Dry ashing, dissolution with HCl
6.5	**Dry ashing, dissolution with HCl/HNO_3**
8.3	Kjeldahl, H_2SO_4/ H_2O_2

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	AES-flame technique/Flame photometer
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**
70	Titration


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Mg
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
-60
Evaluation acc. pretreatment methods
8.3-20
6.5-20
6.1-70
6.1-31
6.1-30
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.4-20
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-31
4.4-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.8-31
3.7-31
3.6-20
3.6-20
3.5-20
3.31-31
3.3-31
3.3-31
3.3-20
3.3-20
3.3-20
3.2-31
3.2-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Mg
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
-60
Evaluation acc. determination methods
70-6.1
41-2
41-2
40-2
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.7
31-3.31
31-3.3
31-3.3
31-3.2
31-3.2
30-6.1
20-8.3
20-6.5
20-6.1
20-6.1
20-5.4
20-4.4
20-4.1
20-3.6
20-3.6
20-3.5
20-3.3
20-3.3
20-3.3
0-0

2.4.6 Potassium

We find good results for X-ray spectrometry but low or too low values for all detections after dry ashing. The other combustions normally lead to sufficient determinations. Drastic deficits are recognised in three data sets with ICP-detection, which are possibly due to instrumental problems.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PK	DK
4	2	40
4a	2	41
7	3.2	31
13	3.3	30
45	3.3	31
3	3.7	31
18	3.8	31
41	4.1	31
42	4.1	31
43	4.1	31
44	4.1	31
48	4.1	31
49	4.1	31
15	4.4	30
20	5.1	20
12	5.1	31
29	5.1	31
2	5.2	31
21	5.4	31
10	6.1	20
28	8.3	20

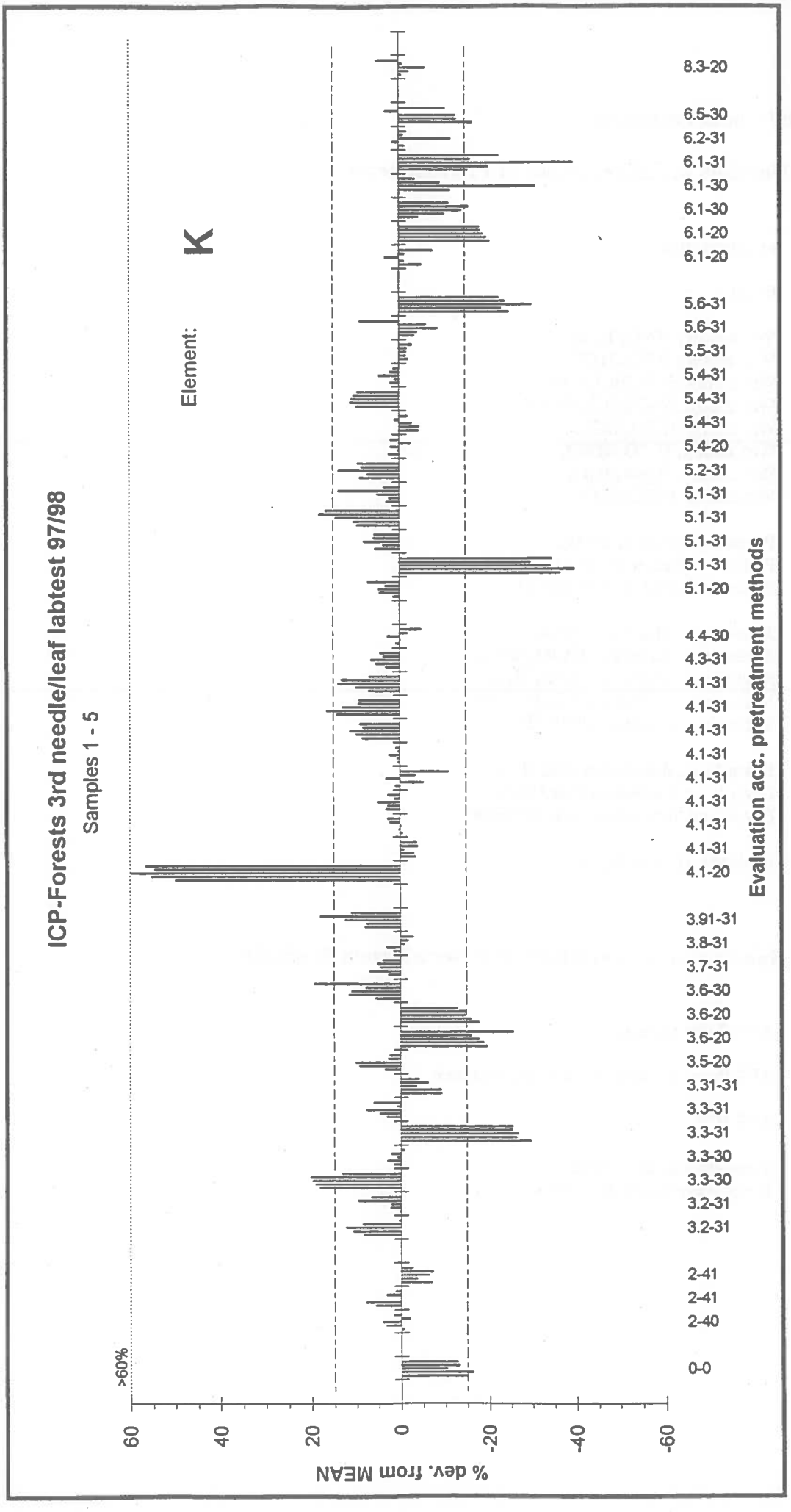
Method Codes-Potassium

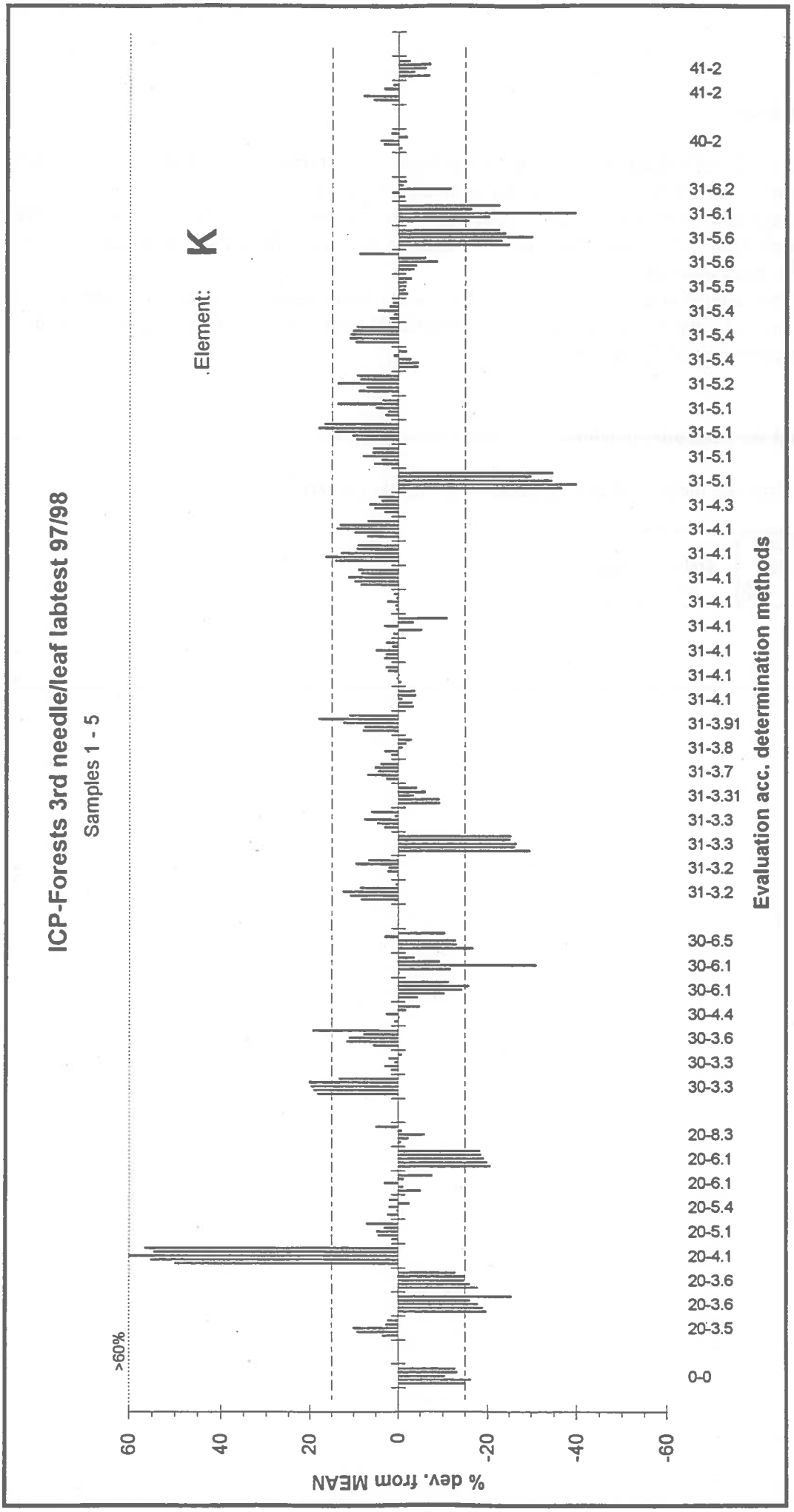
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.8	**Wet ashing, H_2SO_4/H_2O_2**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
4.4	**Pressure digestion, HNO_3/H_2O_2,**
5.1	**Microwave digestion, HNO_3,**
5.2	**Microwave digestion, $HClO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	Microwave digestion, HNO_3/HF
6.1	**Dry ashing, dissolution with HCl**
6.2	Dry ashing, dissolution with HNO_3
6.5	Dry ashing, dissolution with HCl/HNO_3
8.3	**Kjeldahl, H_2SO_4/ H_2O_2**

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	**AES-flame technique/Flame photometer**
31	**AES-ICP**
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: K
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
Evaluation acc. pretreatment methods
8.3-20
6.5-30
6.2-31
6.1-31
6.1-30
6.1-30
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.4-20
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-20
4.4-30
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.8-31
3.7-31
3.6-30
3.6-20
3.6-20
3.5-20
3.31-31
3.3-31
3.3-31
3.3-30
3.3-30
3.2-31
3.2-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: K
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
Evaluation acc. determination methods
41-2
41-2
40-2
31-6.2
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.7
31-3.31
31-3.3
31-3.3
31-3.2
31-3.2
30-6.5
30-6.1
30-6.1
30-4.4
30-3.6
30-3.3
30-3.3
20-8.3
20-6.1
20-6.1
20-5.4
20-5.1
20-4.1
20-3.6
20-3.6
20-3.5
0-0

2.4.7 Sodium

The bad results of sodium may be due to any form of contamination in the laboratory room and equipment, i.e. by dishwashers or sodium containing glasses.
It is a wellknown principle problem in X-Ray spectrometry, that lighter elements as Na have higher detection limits. Obviously the contents of Na in needles and leaves are to low for a sufficient exact analysis.
We find the lowest number of outlier oncemore for detections after a sample combustion with help of pressure digestion digestion. It is possible that the other combustion methods are much more sensitive against contamination.

Proposal for Manual-revision:

Only the method of one laboratory should be preferred:

Lab Nr.	PNa	DNa
42	4.1	31

Method Codes-Sodium

Code Numbers of Abbreviations of Pretreatments

0 no information

2 Pellet

3.1 Wet ashing, HNO_3
3.2 Wet ashing, HNO_3/H_2O_2
3.3 Wet ashing, $HNO_3/HClO_4$
3.31 Wet ashing $HNO_3/HClO_4/HF$
3.5 Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.91 Wet ashing, $HClO_4/H_2O_2$

4.1 **Pressure digestion, HNO_3,**
4.3 Pressure digestion, $HNO_3/HClO_4/HF$,

5.1 Microwave digestion, HNO_3,
5.2 Microwave digestion, $HCLO_4/HNO_3$,
5.4 Microwave digestion, HNO_3/H_2O_2,
5.5 Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6 Microwave digestion, HNO_3/HF

6.1 Dry ashing, dissolution with HCl
6.5 Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

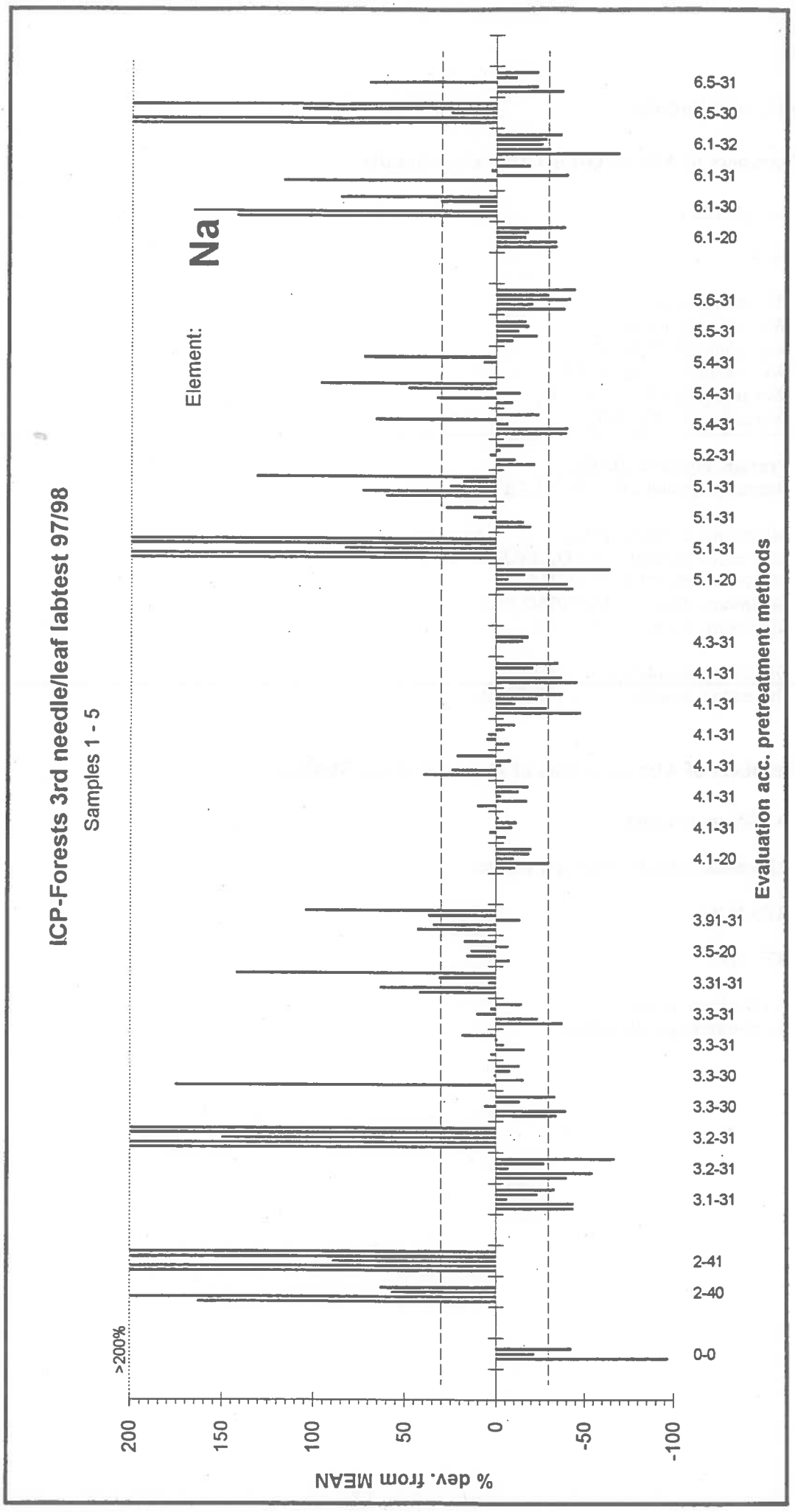
20 AAS-flame technique

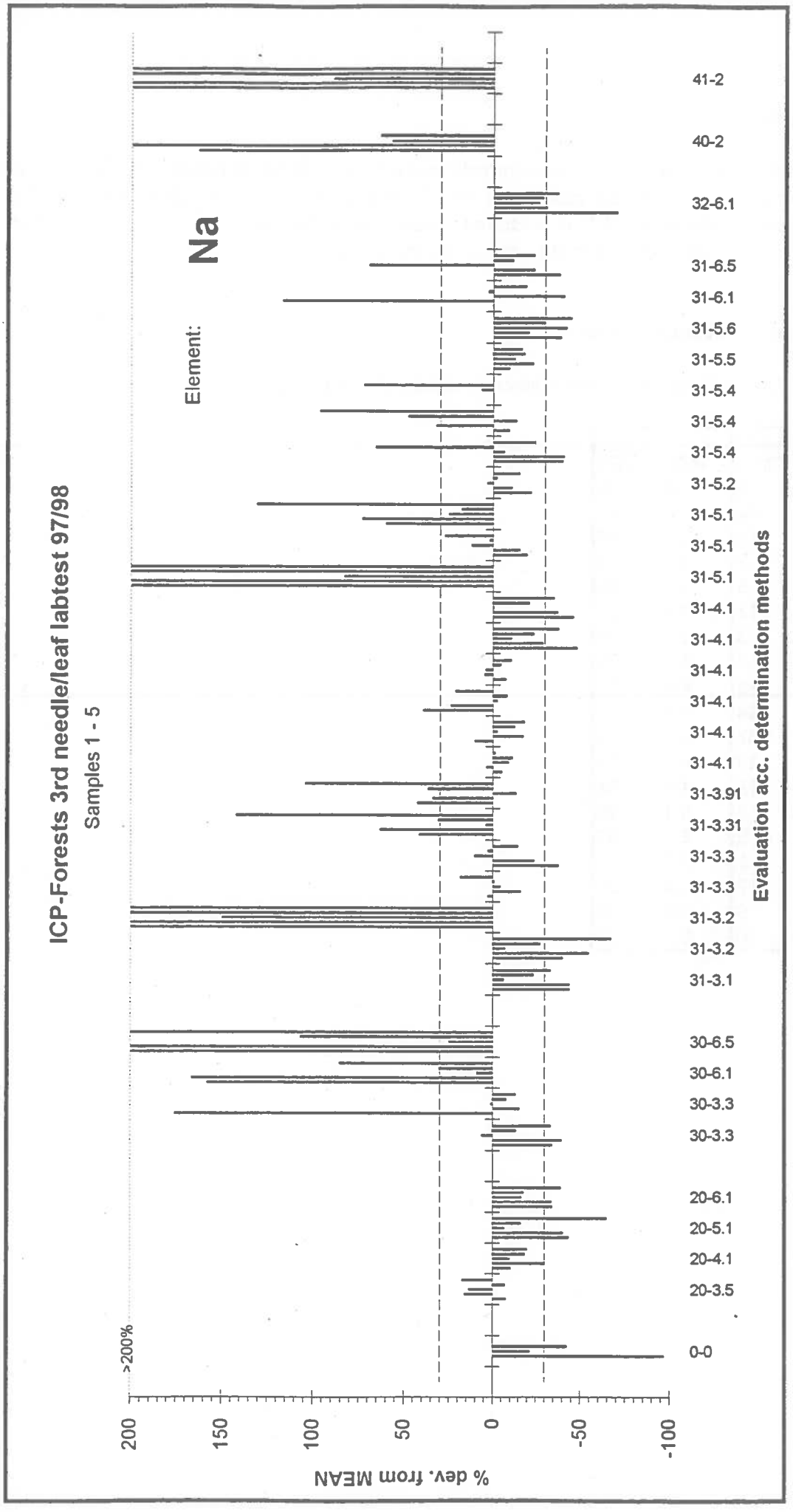
30 AES-flame technique/Flame photometer

31 **AES-ICP**

32 ICP+MS

40 X-ray-energy dispersive
41 X-ray-wavelength dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Na
% dev. from MEAN
>200%
200
150
100
50
0
-50
-100
Evaluation acc. pretreatment methods
6.5-31
6.5-30
6.1-32
6.1-31
6.1-30
6.1-20
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.5-20
3.31-31
3.3-31
3.3-31
3.3-30
3.3-30
3.2-31
3.2-31
3.1-31
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Na
% dev. from MEAN
200
150
100
50
0
-50
-100
>200%
41-2
40-2
32-6.1
31-6.5
31-6.1
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.31
31-3.3
31-3.3
31-3.2
31-3.2
31-3.1
30-6.5
30-6.1
30-3.3
30-3.3
20-6.1
20-5.1
20-4.1
20-3.5
0-0
Evaluation acc. determination methods

2.4.8 Zinc

The determination of zinc in plants normally causes no problem. We find very good results for X-ray spectroscopy of plant pellets and for all methods after pressure digestion digestion and microwave combustion. ICP is preferred. Some heavy outliners are to be found after wet digestion and - with lower turnout - following dry ashing.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PZn	DZn
4	2	40
4a	2	41
45	3.1	31
7	3.2	31
5	3.3	20
13	3.3	20
3	3.7	31
42	4.1	31
43	4.1	31
44	4.1	31
47	4.1	31
48	4.1	31
49	4.1	31
28	5.1	20
29	5.1	31
2	5.2	31
17	5.4	31
6	5.6	31
10	6.1	20

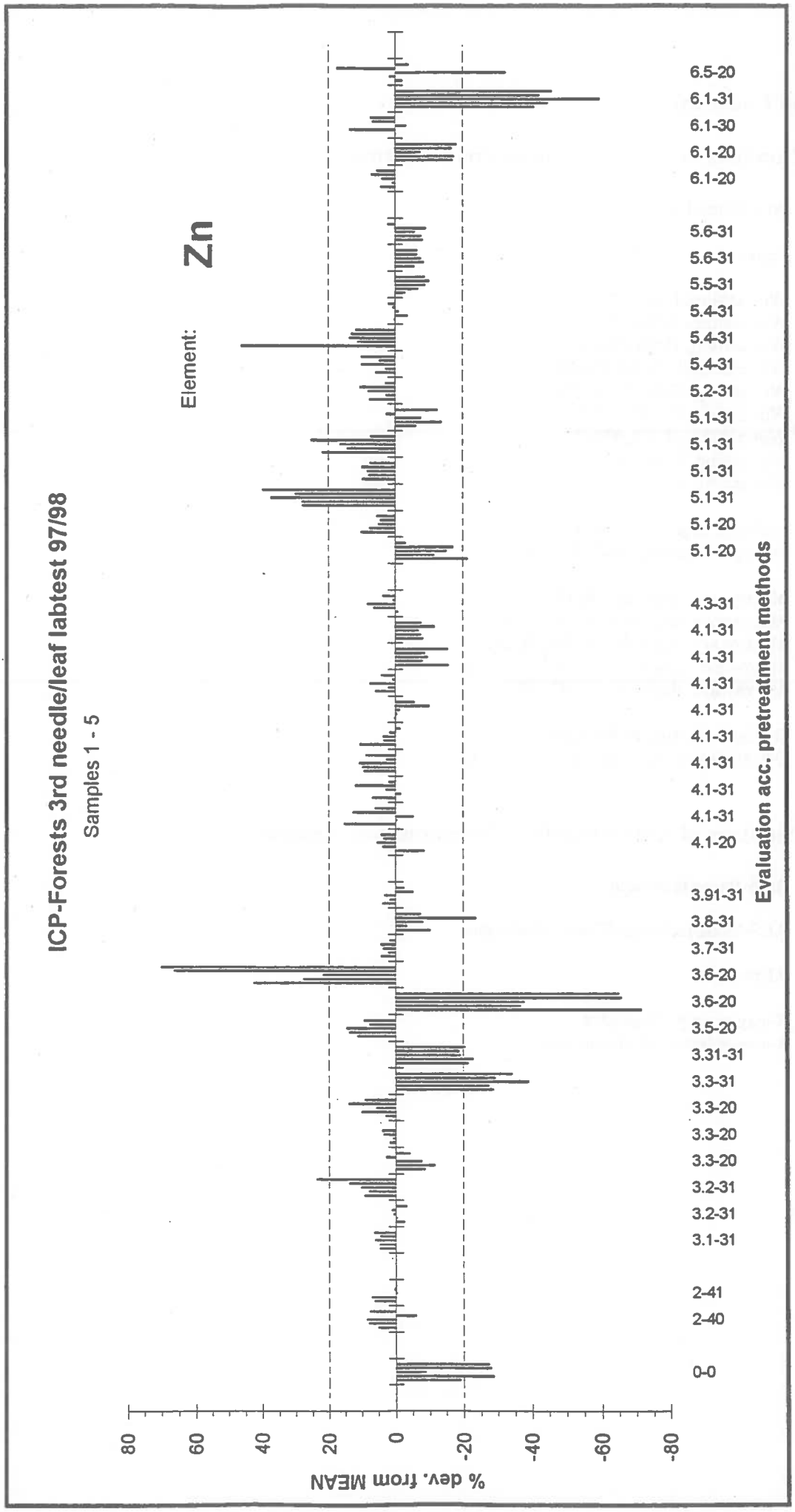
Method Codes-Zinc

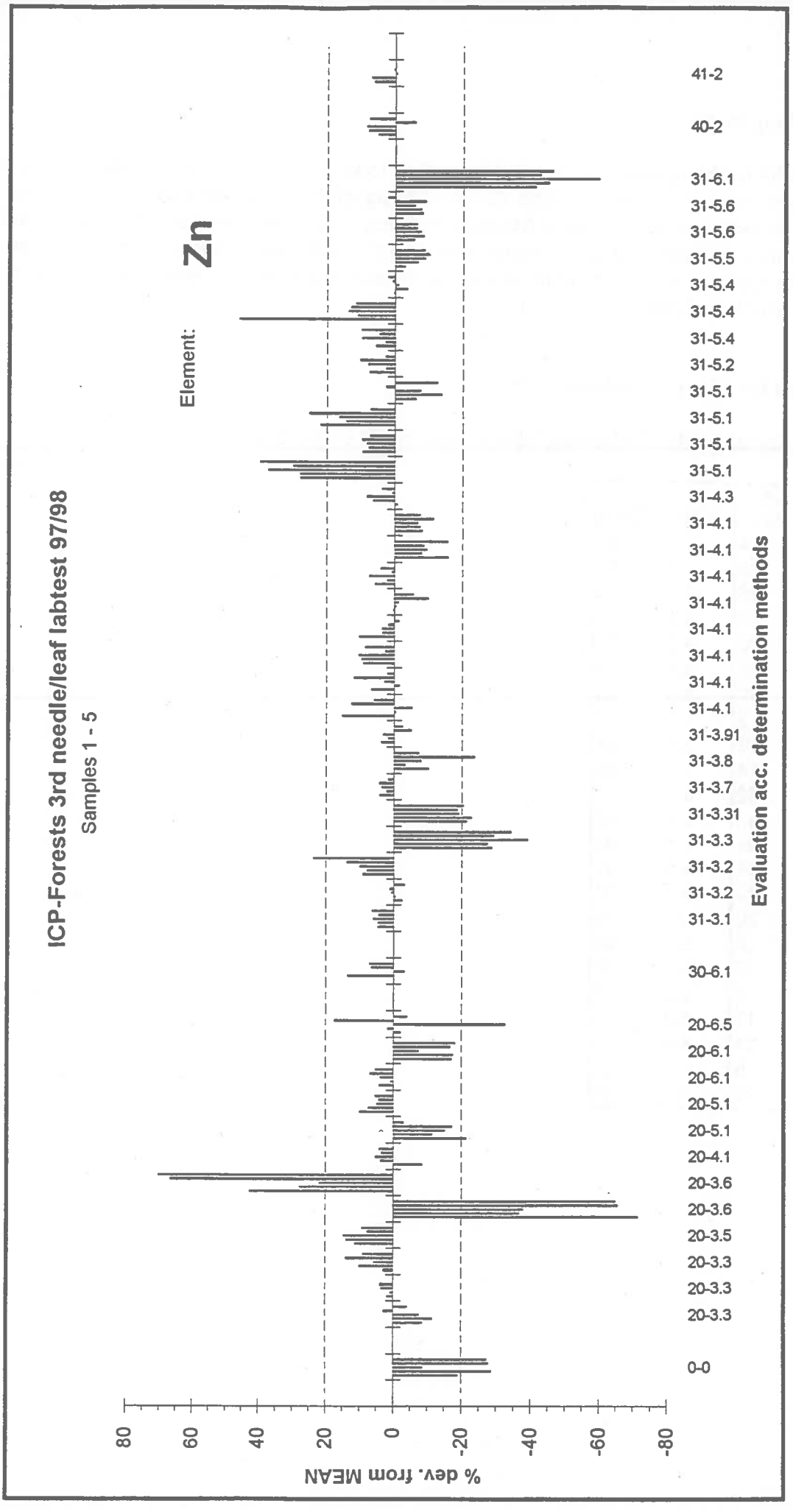
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.1	**Wet ashing, HNO_3**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.8	Wet ashing, H_2SO_4/H_2O_2
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5.1	**Microwave digestion, HNO_3,**
5.2	**Microwave digestion, $HClO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	**Microwave digestion, HNO_3/HF**
6.1	**Dry ashing, dissolution with HCl**
6.5	Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	AES-flame technique/Flame photometer
31	**AES-ICP**
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Zn
% dev. from MEAN
80
60
40
20
0
-20
-40
-60
-80
Evaluation acc. pretreatment methods
6.5-20
6.1-31
6.1-30
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-20
5.1-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.8-31
3.7-31
3.6-20
3.6-20
3.5-20
3.31-31
3.3-31
3.3-20
3.3-20
3.3-20
3.2-31
3.2-31
3.1-31
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Zn
% dev. from MEAN
80
60
40
20
0
-20
-40
-60
-80
Evaluation acc. determination methods
41-2
40-2
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.7
31-3.31
31-3.3
31-3.2
31-3.2
31-3.1
30-6.1
20-6.5
20-6.1
20-6.1
20-5.1
20-5.1
20-4.1
20-3.6
20-3.6
20-3.5
20-3.3
20-3.3
20-3.3
0-0

2.4.9 Manganese

The results for Manganese are not as bad as they look on the first view. It is the element with the largest range of all elements from (20 to 1400 µg/g). Most outliners are recognised for No. 4, the sample with the lowest Mn-concentration. In the same way as it has been found for other metals, pressure digestion methods lead to the best results and wet digestion methods cause the most outliners. The tendency of microwave digestion is to more values above mean, for dry ashing methods it is reversed.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PMn	DMn
4	2	40
4a	2	41
45	3.1	31
7	3.2	31
26	3.2	31
5	3.3	20
31	3.5	20
3	3.7	31
18	3.8	31
14	4.1	20
42	4.1	31
43	4.1	31
44	4.1	31
48	4.1	31
49	4.1	31
20	5.1	20
28	5.1	20
25	5.1	31
2	5.2	31
17	5.4	31
21	5.4	31
6	5.6	31
27	6.1	20

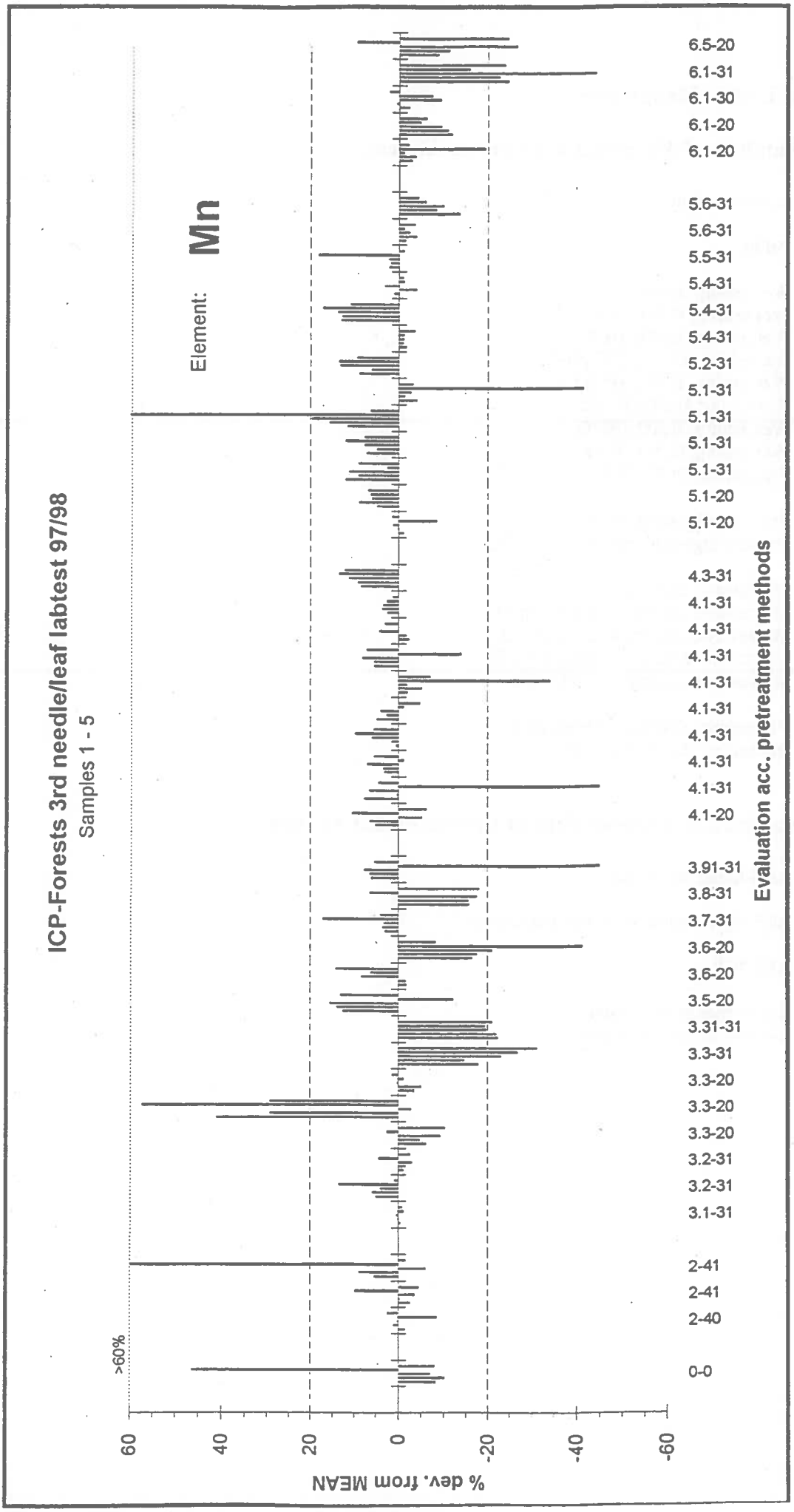
Method Codes- Manganese

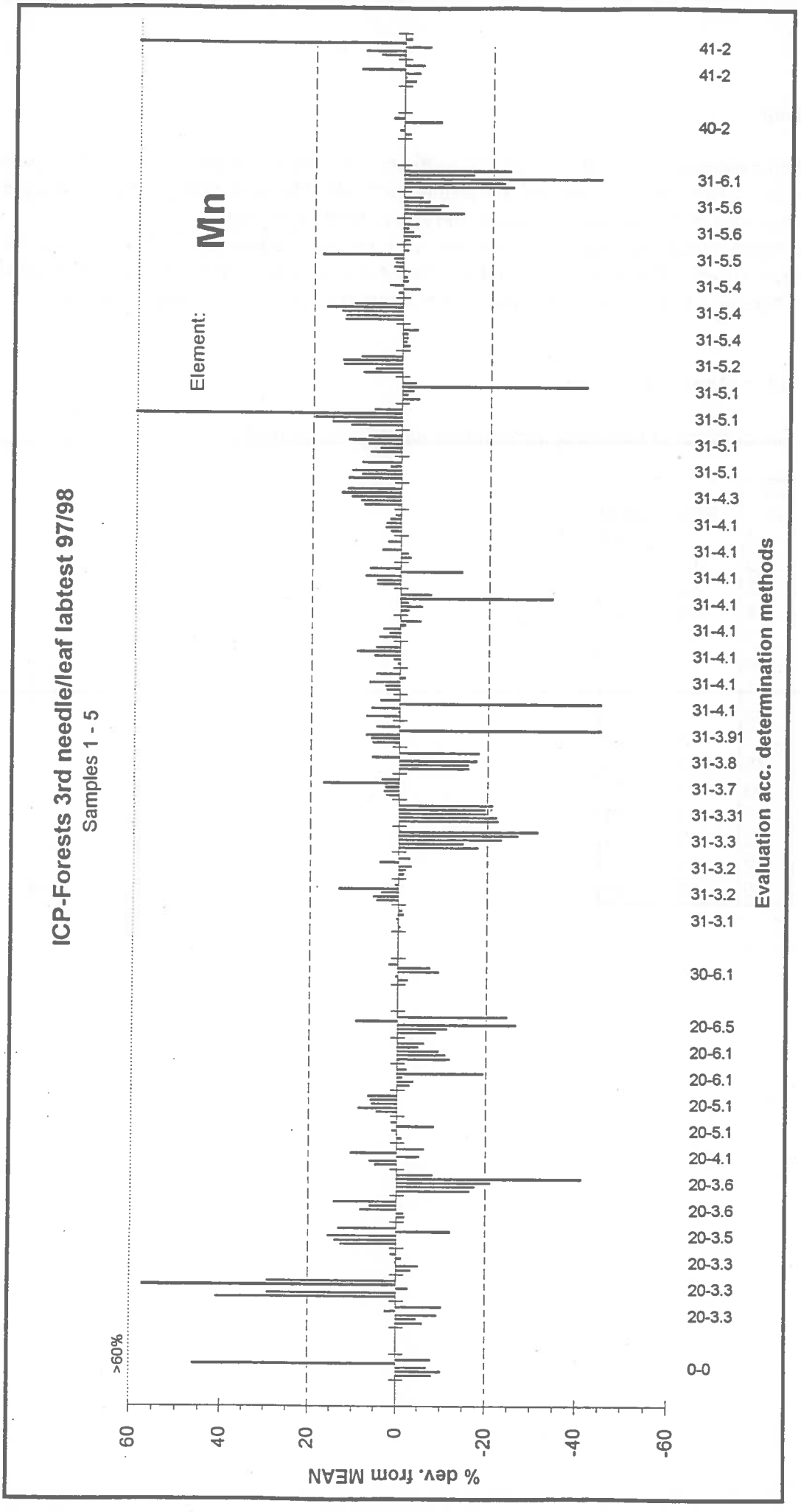
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.1	**Wet ashing, HNO_3**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	**Wet ashing, $HNO_3/HClO_4/H_2O_2$**
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.8	**Wet ashing, H_2SO_4/H_2O_2**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5.1	**Microwave digestion, HNO_3,**
5.2	**Microwave digestion, $HClO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	**Microwave digestion, HNO_3/HF**
6.1	**Dry ashing, dissolution with HCl**
6.5	Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	AES-flame technique/Flame photometer
31	**AES-ICP**
40	**X-ray-energy dispersive**
41	**X-ray-wavelength dispersive**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Mn
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
Evaluation acc. pretreatment methods
6.5-20
6.1-31
6.1-30
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-20
5.1-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.8-31
3.7-31
3.6-20
3.6-20
3.5-20
3.31-31
3.3-31
3.3-20
3.3-20
3.3-20
3.2-31
3.2-31
3.1-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Mn
% dev. from MEAN
>60%
60
40
20
0
-20
-40
-60
Evaluation acc. determination methods
41-2
41-2
40-2
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.7
31-3.31
31-3.3
31-3.2
31-3.2
31-3.1
30-6.1
20-6.5
20-6.1
20-6.1
20-5.1
20-5.1
20-4.1
20-3.6
20-3.6
20-3.5
20-3.3
20-3.3
20-3.3
0-0

2.4.10 Iron

The unhomogeneous results of iron are not sufficient. The determination seems to be a serious problem for X-Ray spectrometry and dry ashing methods. This may possibly be a consequence of contamination of the sample with elementary iron during grinding.
The wet digestion method and microwave and even pressure digestion combustion causes a lot of outliners as well. They do not depend on the Fe-concentration in the sample. Nevertheless pressure digestion/ICP or AAS seems to be the surest guaranty for reasonable results.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PFe	DFe
4	2	40
45	3.1	31
7	3.2	31
5	3.3	20
3	3.7	31
14	4.1	20
41	4.1	31
42	4.1	31
47	4.1	31
48	4.1	31
49	4.1	31
12	5.1	31
2	5.2	31
17	5.4	31
6	5.6	31

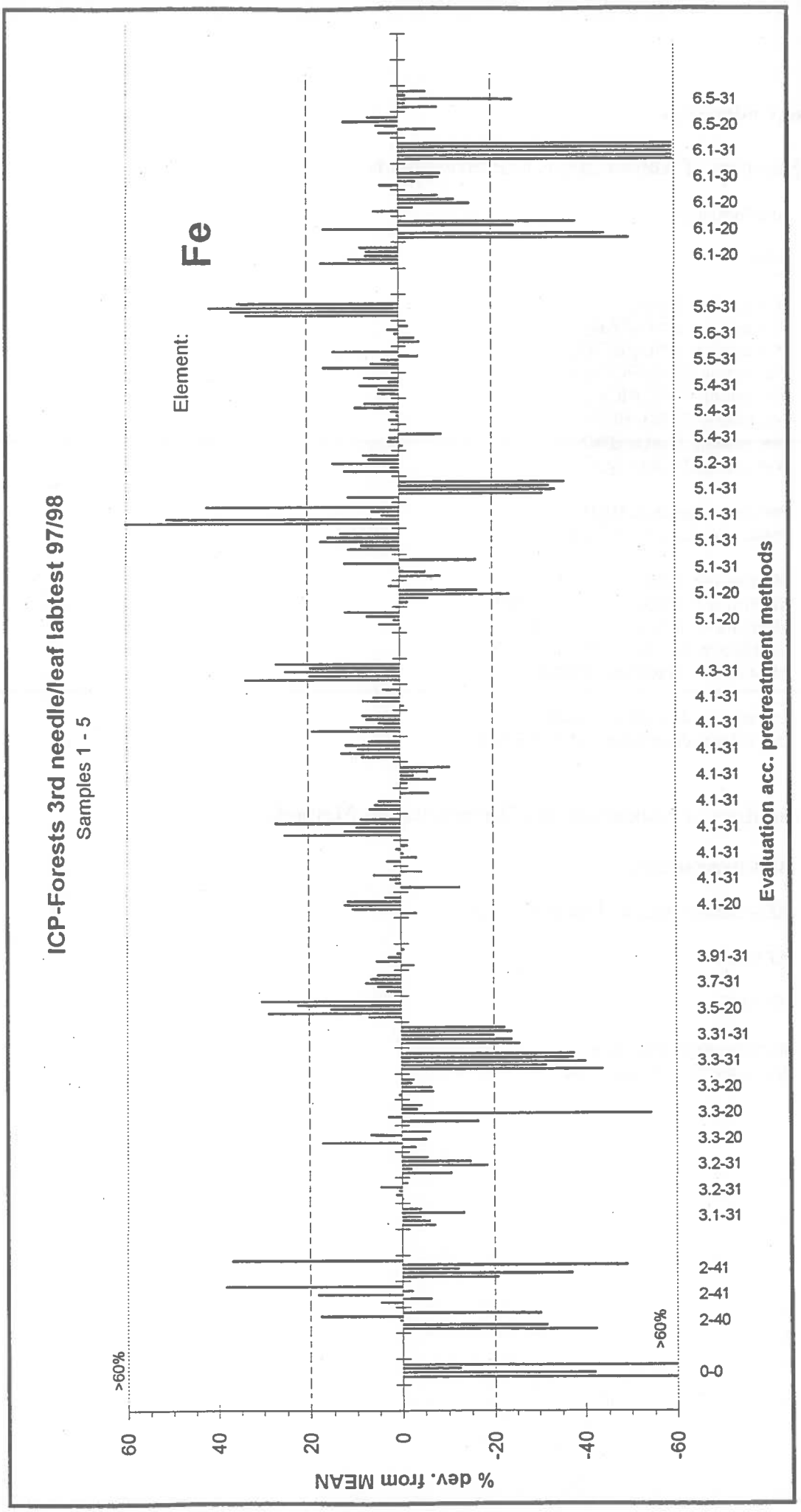
Method Codes-Iron

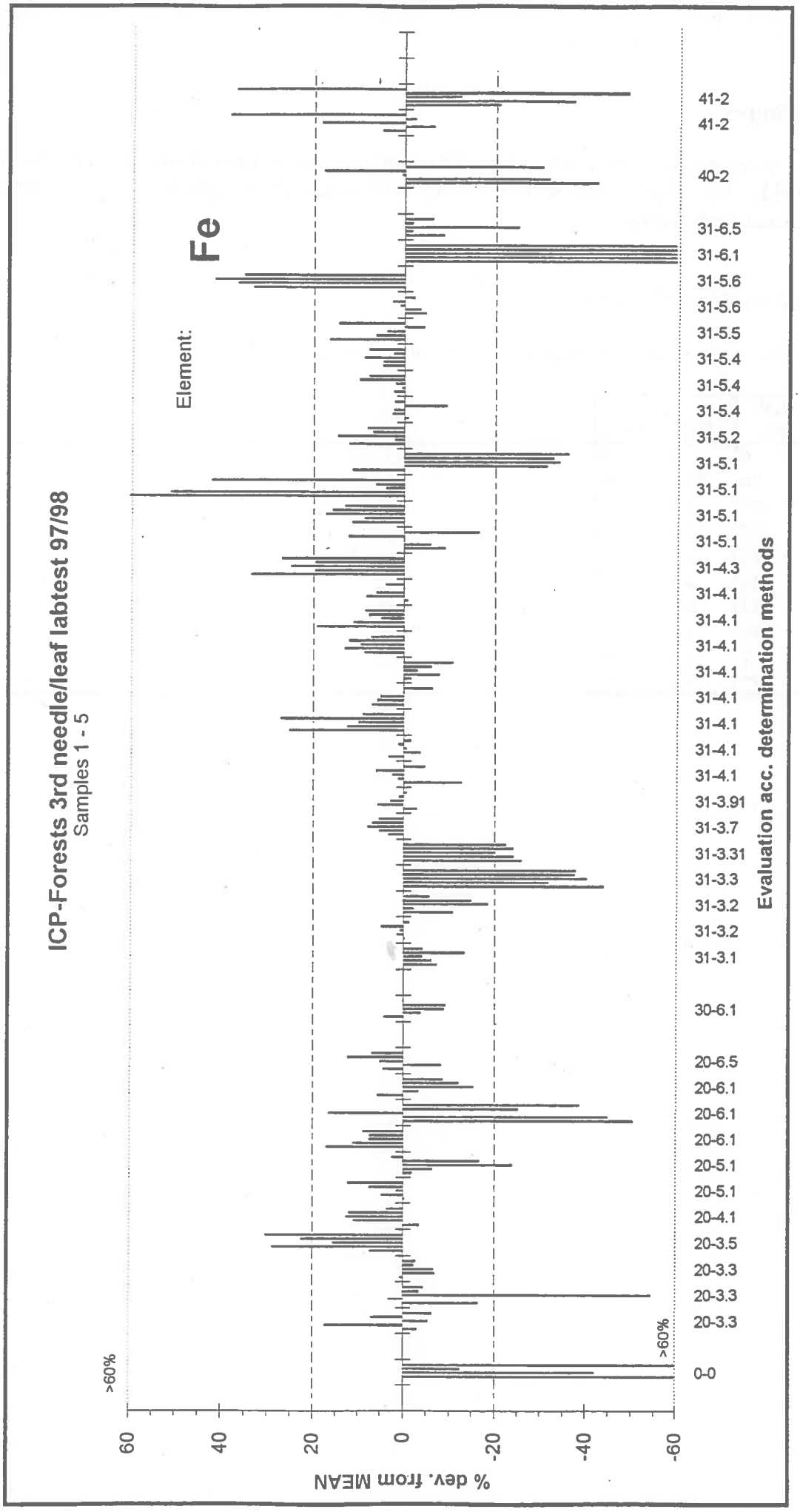
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.1	**Wet ashing, HNO_3**
3.2	**Wet ashing, HNO_3/H_2O_2**
3.3	**Wet ashing, $HNO_3/HClO_4$**
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	**Wet ashing, H_2SO_4/HNO_3**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5.1	**Microwave digestion, HNO_3,**
5.2	**Microwave digestion, $HClO_4/HNO_3$,**
5.4	**Microwave digestion, HNO_3/H_2O_2,**
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	**Microwave digestion, HNO_3/HF**
6.1	Dry ashing, dissolution with HCl
6.5	Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

20	**AAS-flame technique**
30	AES-flame technique/Flame photometer
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	X-ray-wavelength dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Fe
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
>60%
Evaluation acc. pretreatment methods
6.5-31
6.5-20
6.1-31
6.1-30
6.1-20
6.1-20
6.1-20
5.6-31
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
5.1-20
5.1-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-20
3.91-31
3.7-31
3.5-20
3.31-31
3.3-31
3.3-20
3.3-20
3.3-20
3.2-31
3.2-31
3.1-31
2-41
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Fe
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
>60%
Evaluation acc. determination methods
41-2
41-2
40-2
31-6.5
31-6.1
31-5.6
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.7
31-3.31
31-3.3
31-3.2
31-3.2
31-3.1
30-6.1
20-6.5
20-6.1
20-6.1
20-6.1
20-5.1
20-5.1
20-4.1
20-3.5
20-3.3
20-3.3
20-3.3
0-0

2.4.11 Copper

We find many outliners after dry ashing. The combination dry ashing/flame AAS is obviously not suitable. All other chosen methods seem -with singularly exceptions - to be better and equal in analytical quality.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PCu	DCu
4	2	40
8a	3.31	31
31	3.5	20
18	3.8	31
41	4.1	21
44	4.1	31
47	4.1	31
48	4.1	31
17	5.4	31
21	5.4	31

Method Codes-Copper

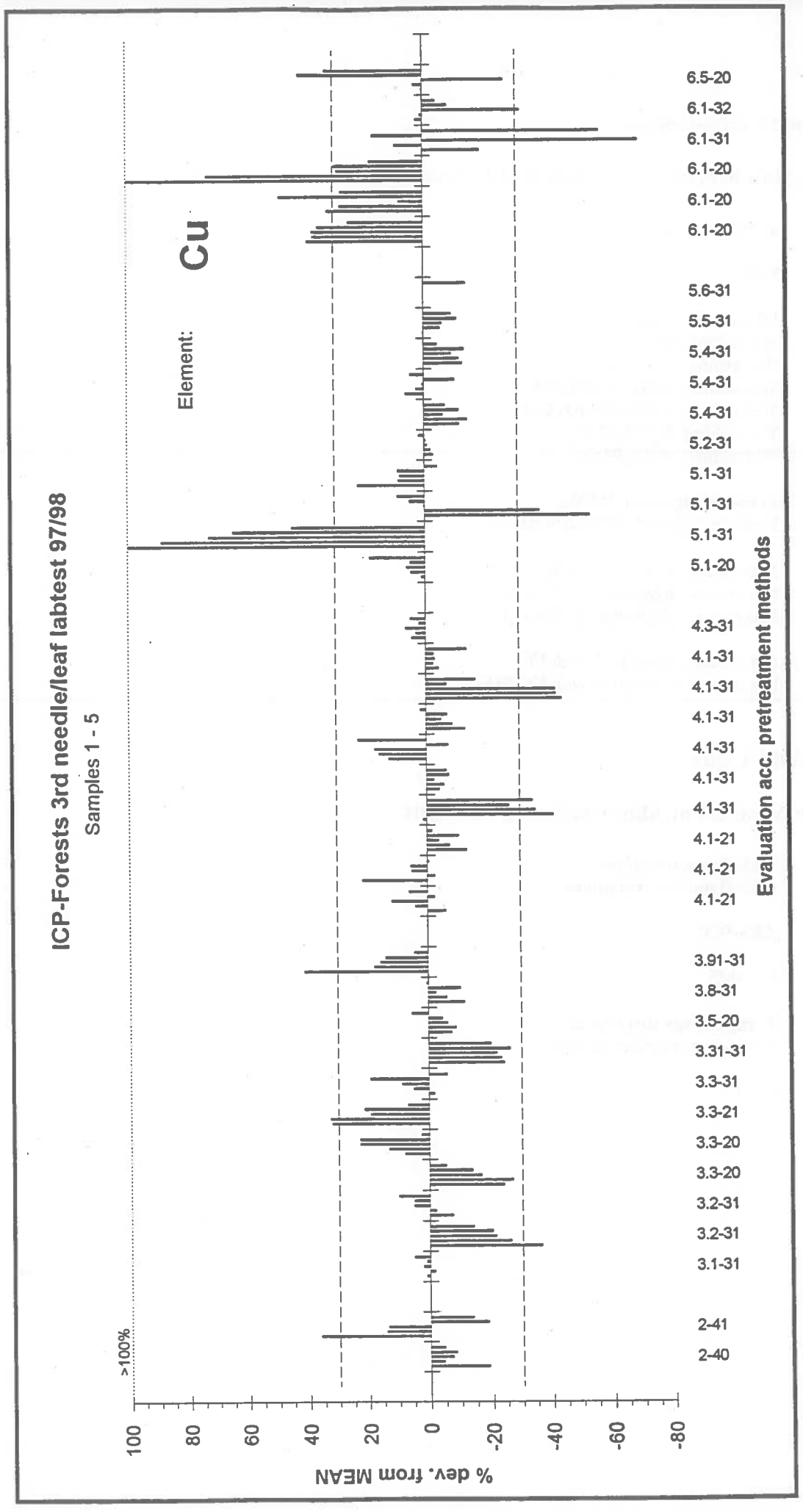
Code Numbers of Abbreviations of Pretreatments

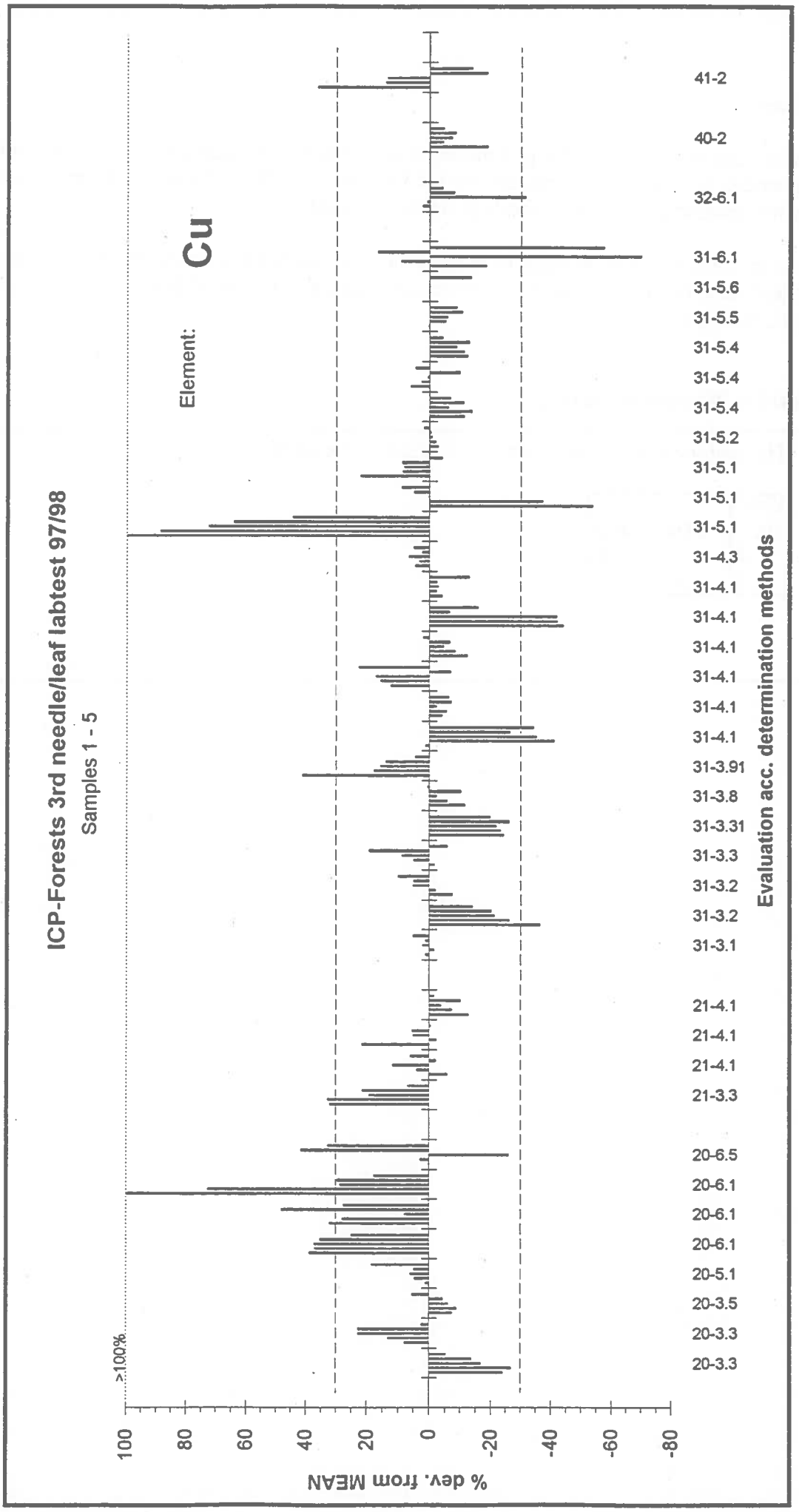
0	no information
2	**Pellet**
3.1	Wet ashing, HNO_3
3.2	Wet ashing, HNO_3/H_2O_2
3.3	Wet ashing, $HNO_3/HClO_4$
3.31	**Wet ashing $HNO_3/HClO_4/HF$**
3.5	**Wet ashing, $HNO_3/HClO_4/H_2O_2$**
3.8	**Wet ashing, H_2SO_4/H_2O_2**
3.91	Wet ashing, $HClO_4/H_2O_2$
4.1	**Pressure digestion, HNO_3,**
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5.1	Microwave digestion, HNO_3,
5.2	Microwave digestion, $HClO_4/HNO_3$,
5.4	**Microwave digestion, HNO_3/H_2O_2,**
6.1	Dry ashing, dissolution with HCl
6.5	Dry ashing, dissolution with HCl/HNO_3

Method Code

Code Numbers of Abbreviations of Methods

20	**AAS-flame technique**
21	**AAS-flameless technique**
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	X-ray-wavelength dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Cu
Evaluation acc. pretreatment methods
6.5-20
6.1-32
6.1-31
6.1-20
6.1-20
6.1-20
5.6-31
5.5-31
5.4-31
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-20
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-21
4.1-21
4.1-21
3.91-31
3.8-31
3.5-20
3.31-31
3.3-31
3.3-21
3.3-20
3.3-20
3.2-31
3.2-31
3.1-31
2-41
2-40
>100%
100
80
60
40
20
0
-20
-40
-60
-80
% dev. from MEAN


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Cu
% dev. from MEAN
100
80
60
40
20
0
-20
-40
-60
-80
>100%
Evaluation acc. determination methods
41-2
40-2
32-6.1
31-6.1
31-5.6
31-5.5
31-5.4
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.91
31-3.8
31-3.31
31-3.3
31-3.2
31-3.2
31-3.1
21-4.1
21-4.1
21-4.1
21-3.3
20-6.5
20-6.1
20-6.1
20-6.1
20-5.1
20-3.5
20-3.3
20-3.3

2.4.12 Lead

No method can be favourite. The preliminary best method is pressure digestion combined with electrothermal AAS or, if the contents are not too low, with ICP. X-Ray spectrometry also is inadequate because of sometimes too high detection limits.

We have to state, that the increase of ICP-methods in the laboratories leads to a decrease of routine lead determination. Many laboratories obviously shy the use of slow, but more sensitive electrothermal AAS.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PPb	DPb
4	2	40
3	3.7	31

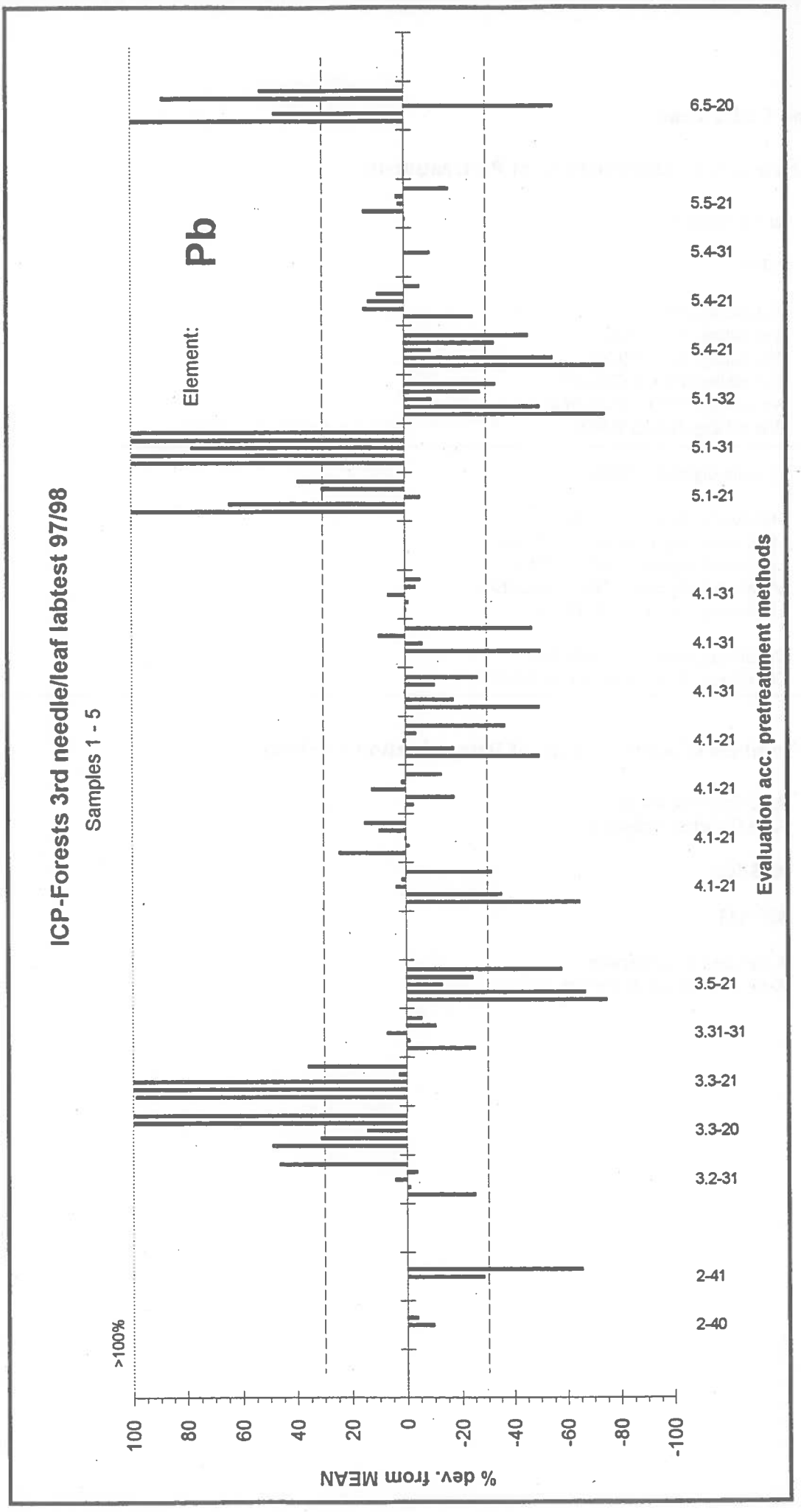
Method Codes-Lead

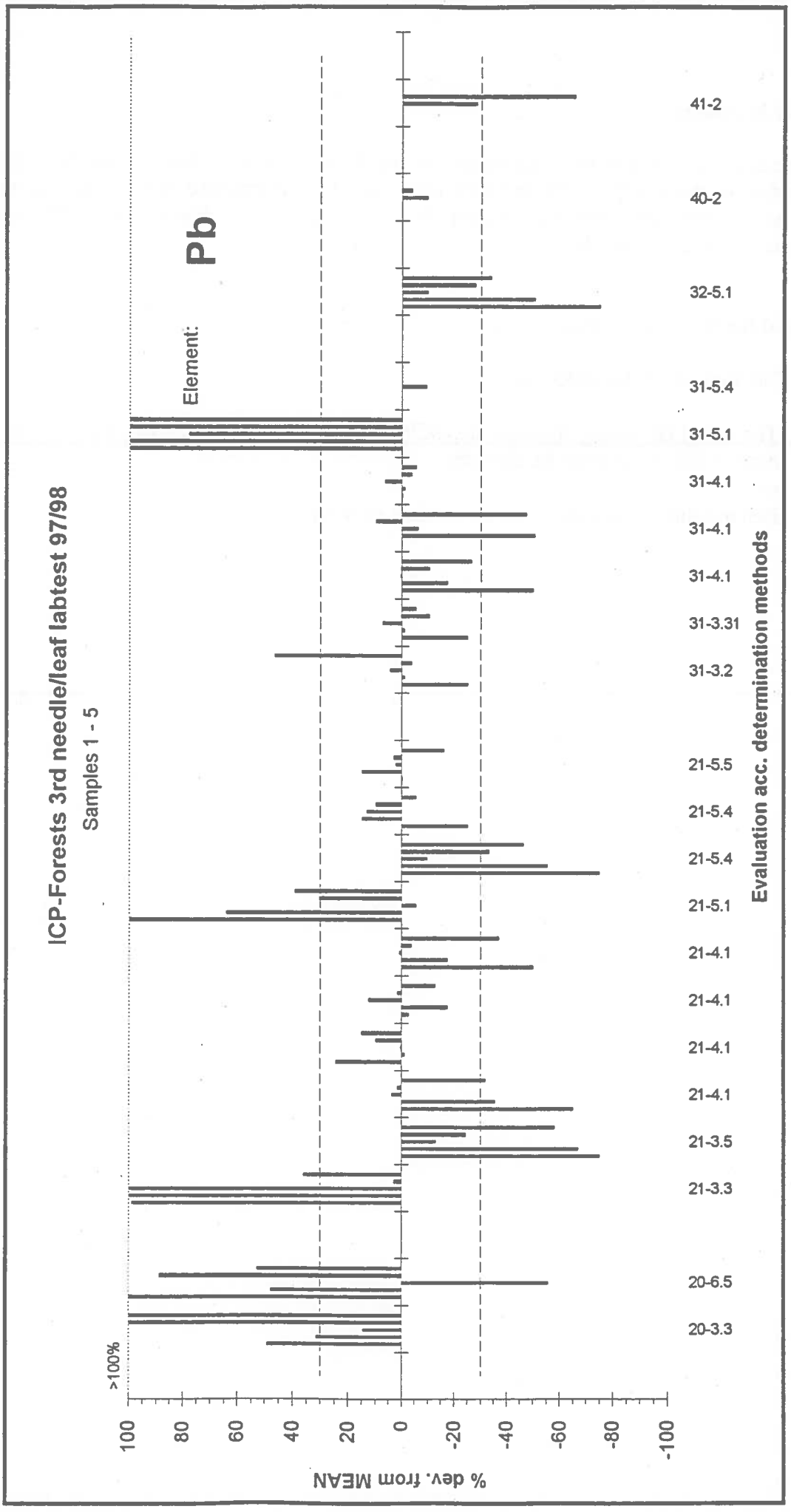
Code Numbers of Abbreviations of Pretreatments

0	no information
2	**Pellet**
3.1	Wet ashing, HNO_3
3.2	Wet ashing, HNO_3/H_2O_2
3.3	Wet ashing, $HNO_3/HClO_4$
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.7	**Wet ashing, H_2SO_4/HNO_3**
4.1	Pressure digestion, HNO_3,
5.1	Microwave digestion, HNO_3,
5.2	Microwave digestion, $HCLO_4/HNO_3$,
5.4	Microwave digestion, HNO_3/H_2O_2,
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	Microwave digestion, HNO_3/HF
6.1	Dry ashing, dissolution with HCl
6.5	Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

20	AAS-flame technique
21	AAS-flameless technique
31	**AES-ICP**
32	ICP+MS
40	**X-ray-energy dispersive**
41	X-ray-wavelength dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Pb
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
Evaluation acc. pretreatment methods
6.5-20
5.5-21
5.4-31
5.4-21
5.4-21
5.1-32
5.1-31
5.1-21
4.1-31
4.1-31
4.1-31
4.1-21
4.1-21
4.1-21
4.1-21
3.5-21
3.31-31
3.3-21
3.3-20
3.2-31
2-41
2-40


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Pb
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
41-2
40-2
32-5.1
31-5.4
31-5.1
31-4.1
31-4.1
31-4.1
31-3.31
31-3.2
21-5.5
21-5.4
21-5.4
21-5.1
21-4.1
21-4.1
21-4.1
21-4.1
21-3.5
21-3.3
20-6.5
20-3.3
Evaluation acc. determination methods

2.4.13 Aluminium

The picture that we get from aluminium is insufficient. It is a well-known fact that all combustion methods without HF normally lead - due to uncompleted sample dissolution - to minor results. But only 3 laboratories used HF for the digestion of silicon matrix. Therefore it is senseless to evaluate the data.

Proposal for Manual-revision:

No method can be preferred:

The use of HF during digestion step/ICP or use of X-ray spectroscopy (if element cont. > 100 mg/g) must be coercive.
or
Renunciation of Aluminium as an optional element.

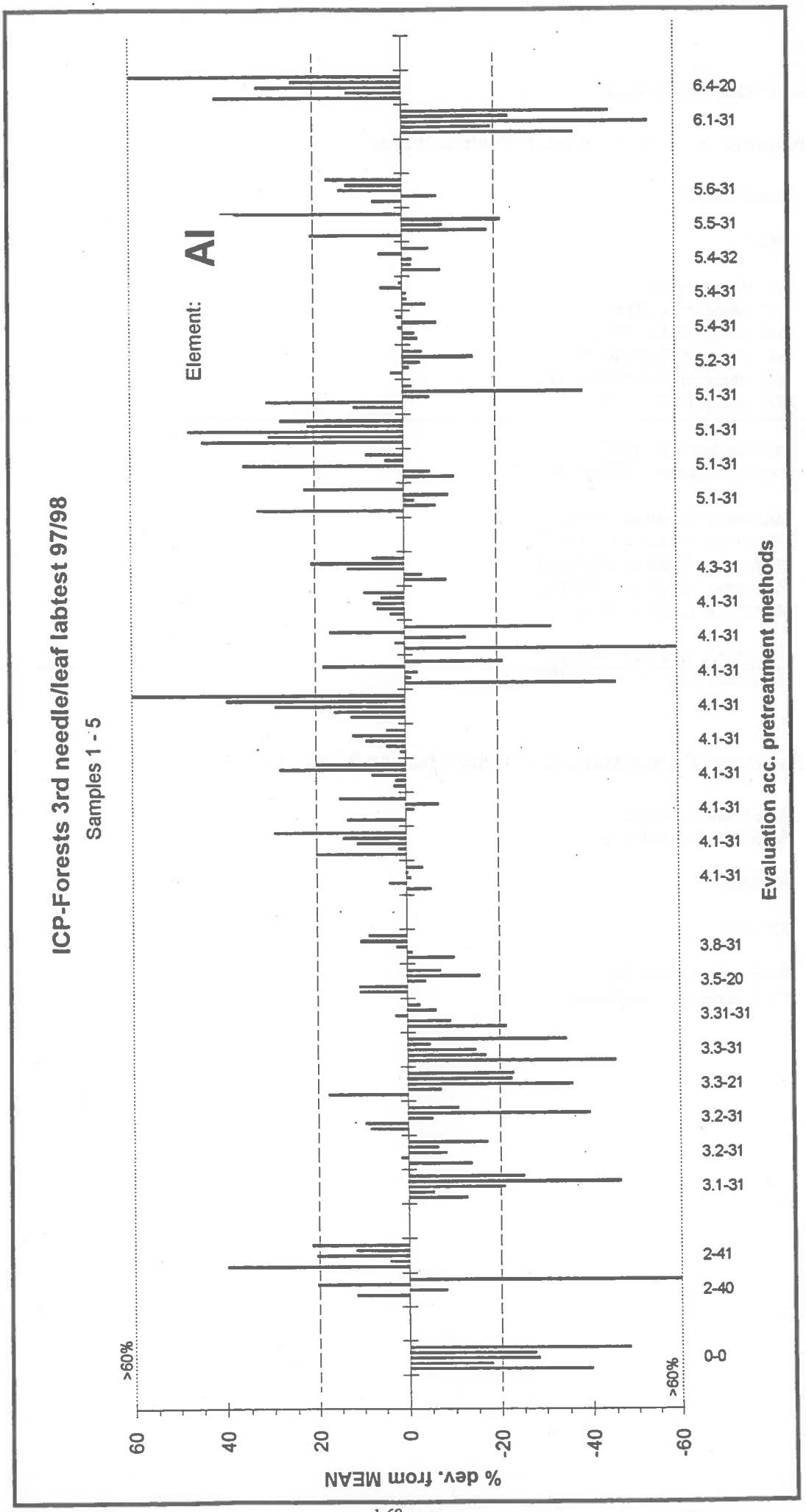
Method Codes-Aluminium

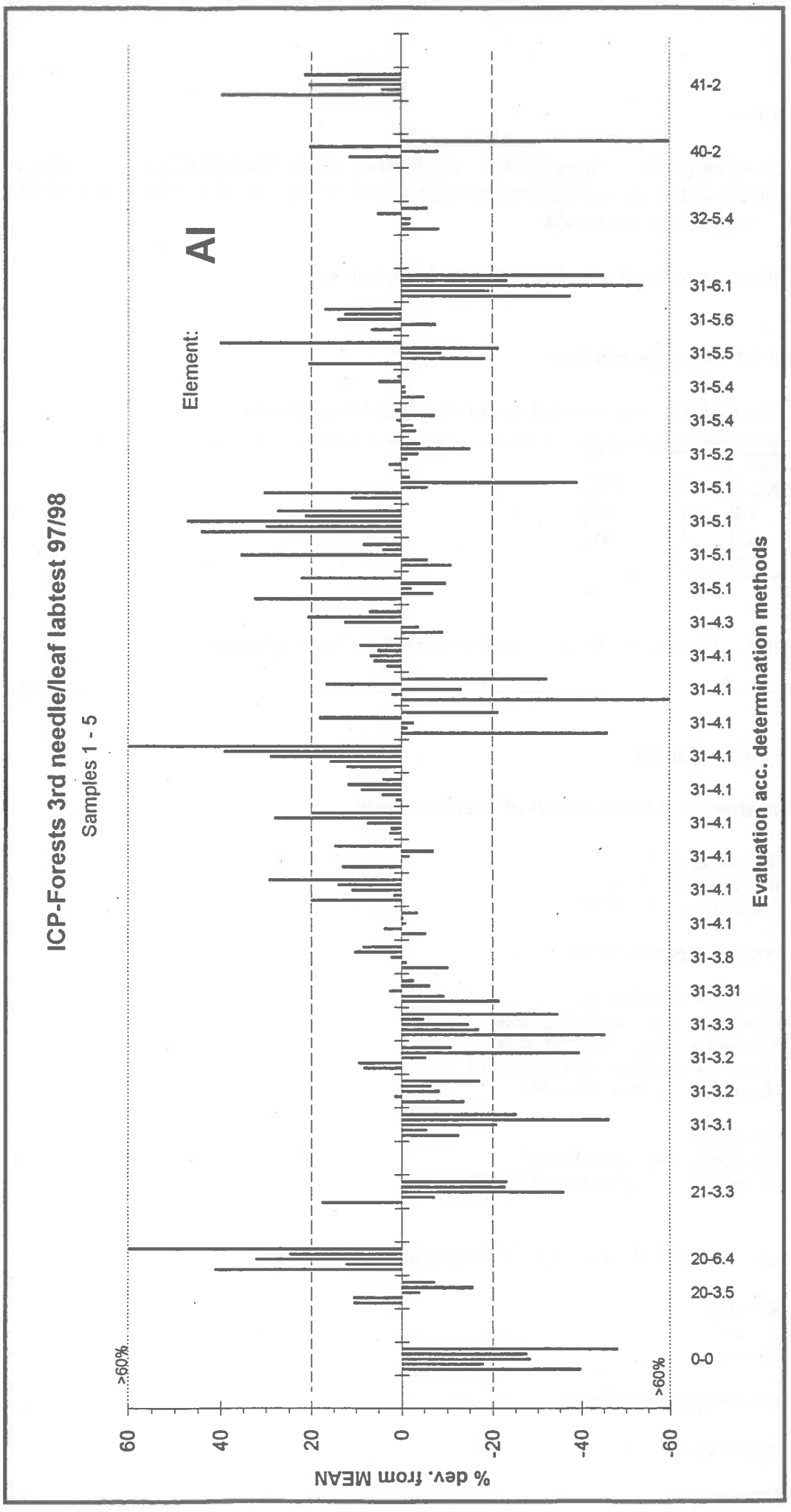
Code Numbers of Abbreviations of Pretreatments

0	no information
2	Pellet
3.1	Wet ashing, HNO_3
3.2	Wet ashing, HNO_3/H_2O_2
3.3	Wet ashing, $HNO_3/HClO_4$
3.31	Wet ashing $HNO_3/HClO_4/HF$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.8	Wet ashing, H_2SO_4/H_2O_2
4.1	Pressure digestion, HNO_3,
4.3	Pressure digestion, $HNO_3/HClO_4/HF$,
5.1	Microwave digestion, HNO_3,
5.2	Microwave digestion, $HClO_4/HNO_3$,
5.4	Microwave digestion, HNO_3/H_2O_2,
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6	Microwave digestion, HNO_3/HF
6.1	Dry ashing, dissolution with HCl
6.4	Dry ashing, dissolution with HF/HCl

Code Numbers of Abbreviations of Determination Methods

20	AAS-flame technique
21	AAS-flameless technique
31	AES-ICP
32	ICP+MS
40	X-ray-energy dispersive
41	X-ray-wavelength dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Al
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
>60%
Evaluation acc. pretreatment methods
6.4-20
6.1-31
5.6-31
5.5-31
5.4-32
5.4-31
5.4-31
5.2-31
5.1-31
5.1-31
5.1-31
5.1-31
4.3-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
4.1-31
3.8-31
3.5-20
3.31-31
3.3-31
3.3-21
3.2-31
3.2-31
3.1-31
2-41
2-40
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Al
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
>60%
Evaluation acc. determination methods
41-2
40-2
32-5.4
31-6.1
31-5.6
31-5.5
31-5.4
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-5.1
31-4.3
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.8
31-3.31
31-3.3
31-3.2
31-3.2
31-3.1
21-3.3
20-6.4
20-3.5
0-0

2.4.14 Boron

It is obvious that pressure digestion/ICP - combination causes the best results. Dry ashing prior to calorimetric detection is often successful, but with exception. Wet ashing and microwave methods cause ambiguous results.

Some outliners may be due to dish washers or. detergents.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PB	DB
14	4.1	31
42	4.1	31
21	5.4	31

ann.: HF must not be used because of volatile BF_I^--compounds

Method Codes-Boron

Code Numbers of Abbreviations of Pretreatments

3.1 Wet ashing, HNO_3
3.2 Wet ashing, HNO_3/H_2O_2
3.3 Wet ashing, $HNO_3/HClO_4$

4.1 **Pressure digestion, HNO_3,**

5.1 Microwave digestion, HNO_3,
5.2 Microwave digestion, $HClO_4/HNO_3$,
5.4 **Microwave digestion, HNO_3/H_2O_2,**
5.5 Microwave digestion, $HNO_3/H_2O_2/HCl$
5.6 Microwave digestion, HNO_3/HF

6 Dry ashing
6.1 Dry ashing, dissolution with HCl
6.5 Dry ashing, dissolution with HCl/HNO_3

Code Numbers of Abbreviations of Determination Methods

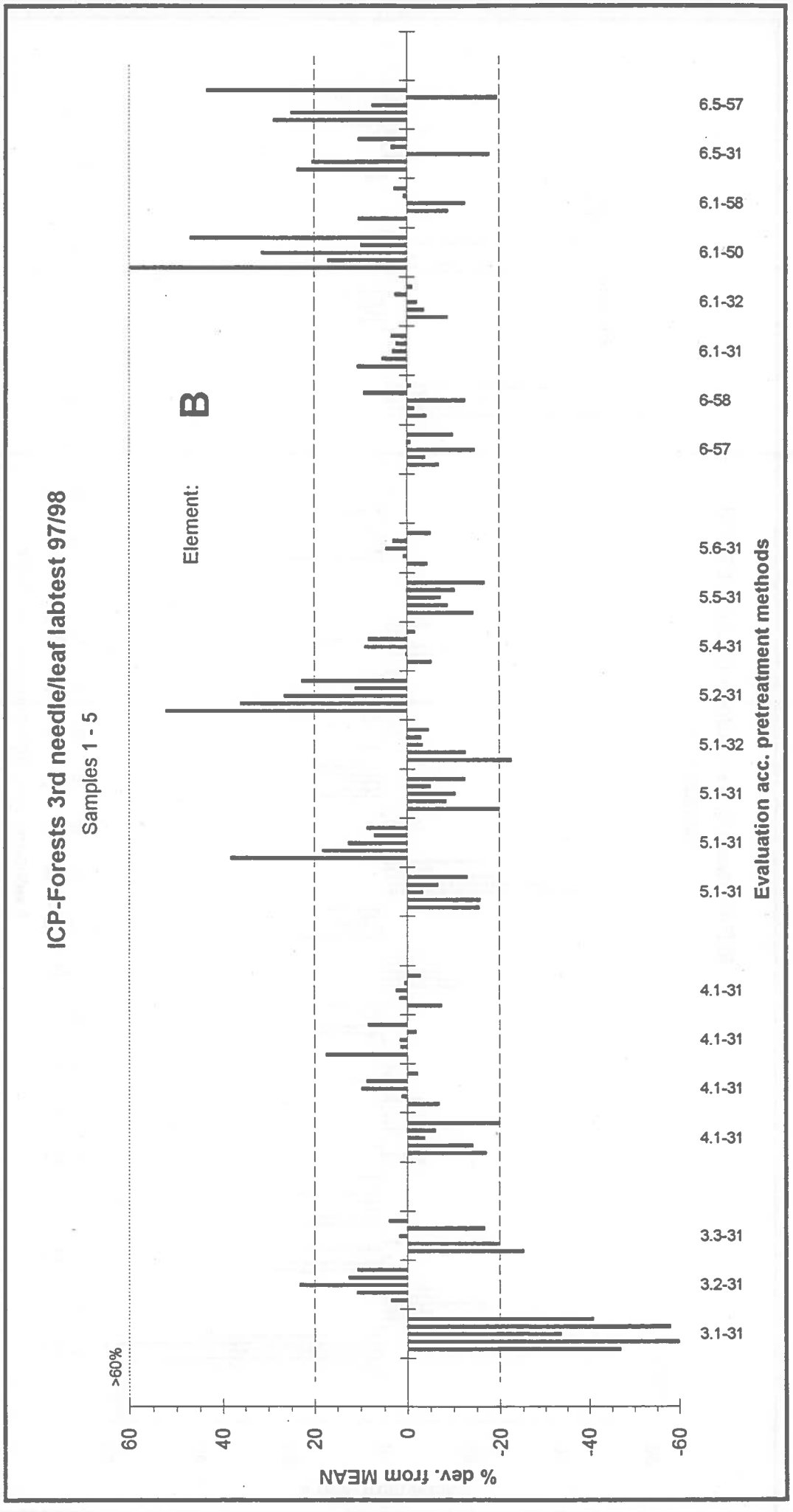
31 **AES-ICP**

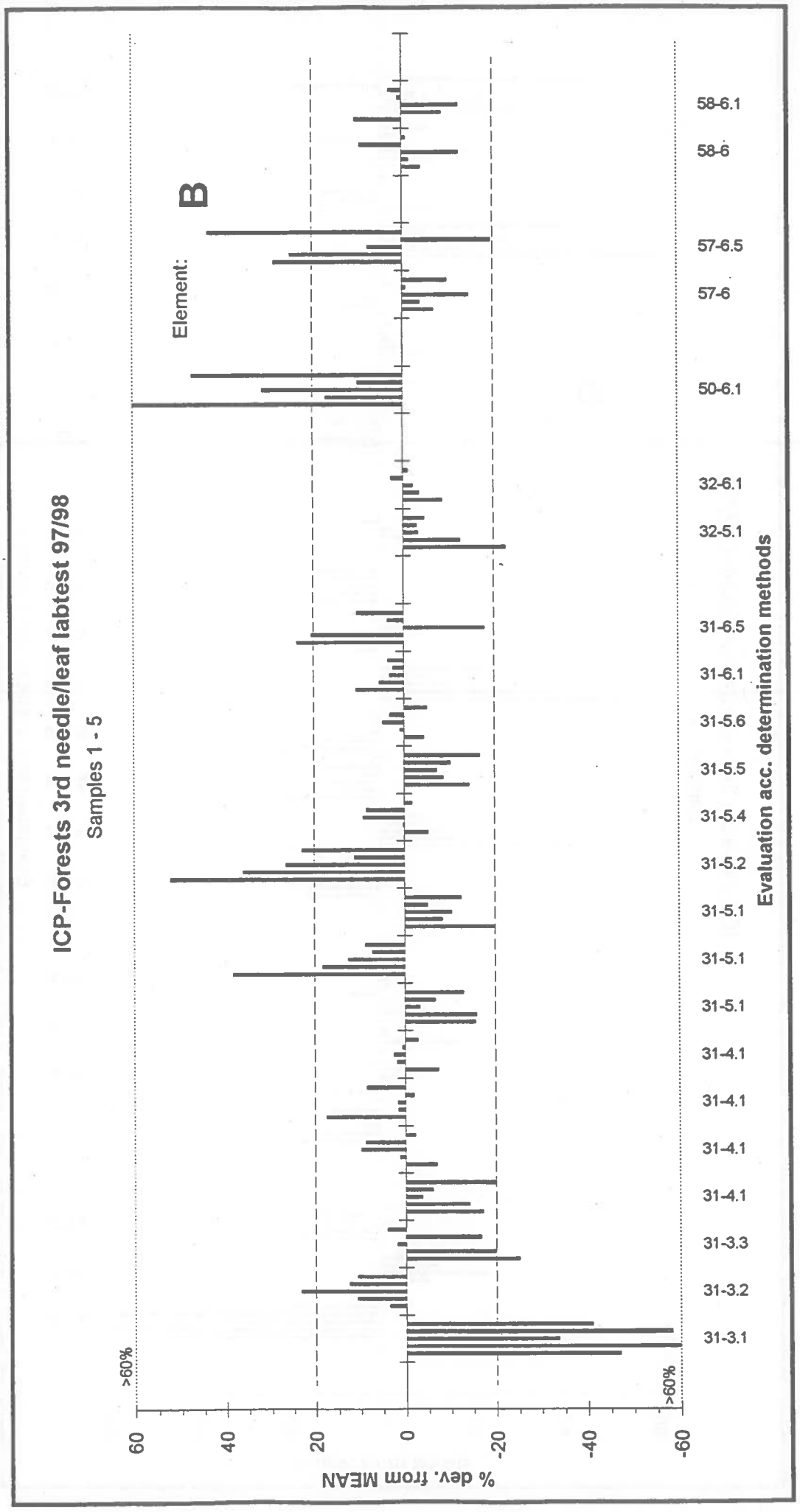
32 ICP+MS

50 UV-VIS spectrophotometry

57 Azomethin - H

58 Carmine


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: B
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
Evaluation acc. pretreatment methods
6.5-57
6.5-31
6.1-58
6.1-50
6.1-32
6.1-31
6-58
6-57
5.6-31
5.5-31
5.4-31
5.2-31
5.1-32
5.1-31
5.1-31
5.1-31
4.1-31
4.1-31
4.1-31
4.1-31
3.3-31
3.2-31
3.1-31


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: B
% dev. from MEAN
60
40
20
0
-20
-40
-60
>60%
>60%
Evaluation acc. determination methods
58-6.1
58-6
57-6.5
57-6
50-6.1
32-6.1
32-5.1
31-6.5
31-6.1
31-5.6
31-5.5
31-5.4
31-5.2
31-5.1
31-5.1
31-5.1
31-4.1
31-4.1
31-4.1
31-4.1
31-3.3
31-3.2
31-3.1

2.4.15 Cadmium

The number of outliners is very high, but we recognise that pressure digestion joined with electrothermal AAS or ICP is the most homogeneous group of values.

Proposal for Manual-revision:

No method can be preferred

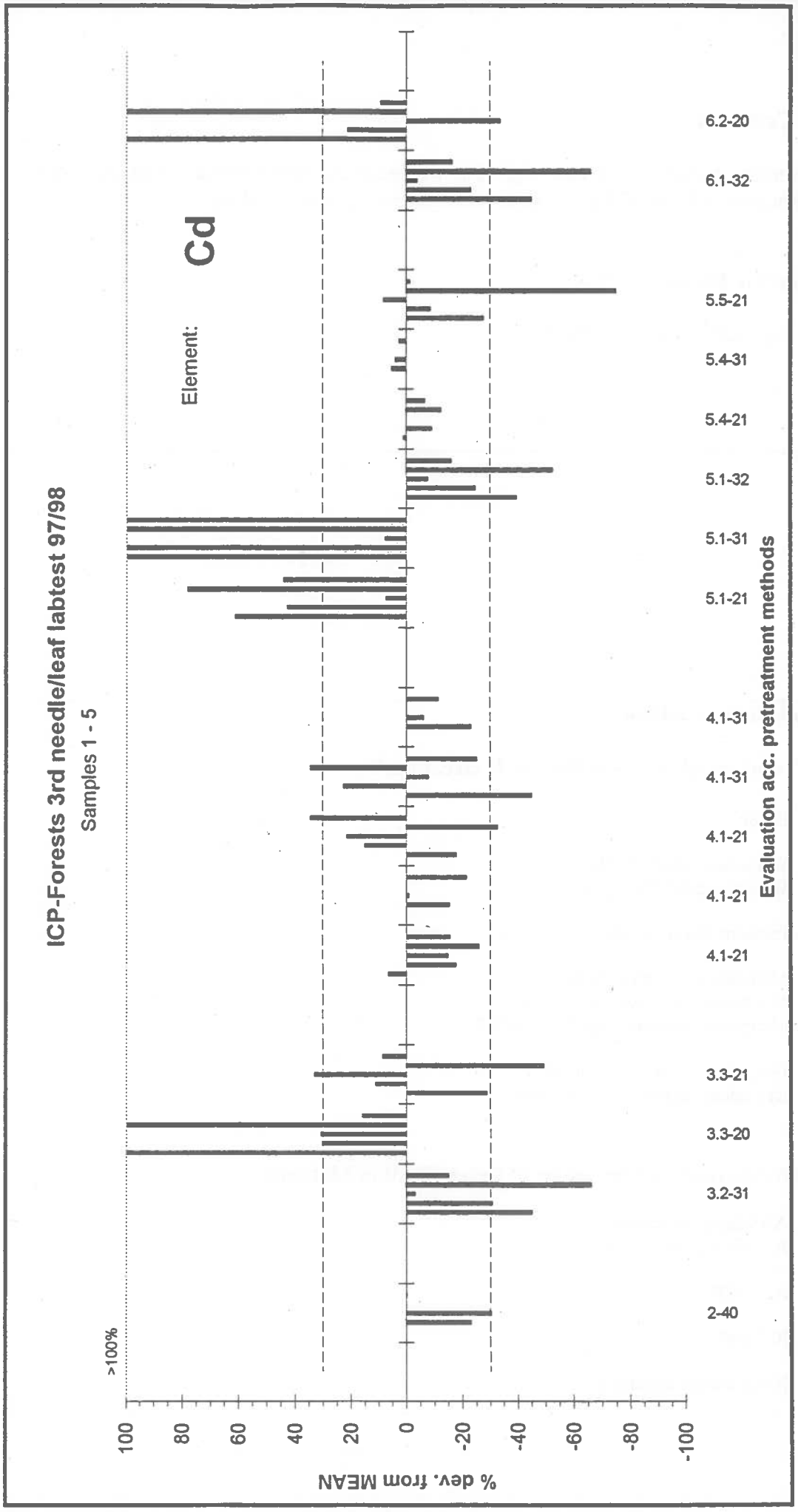
Method Codes-Cadmium

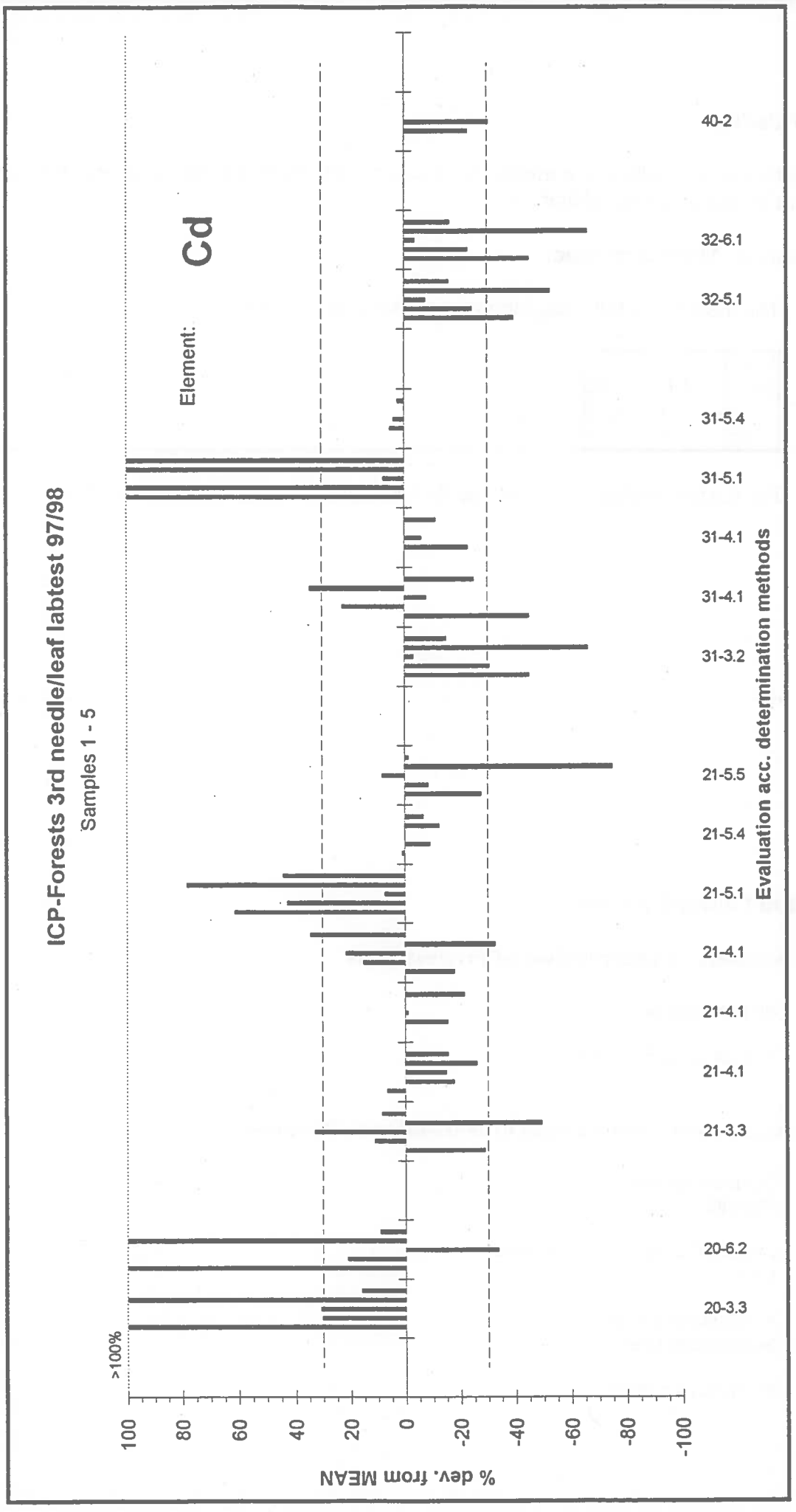
Code Numbers of Abbreviations of Pretreatments

2	Pellet
3.2	Wet ashing, HNO_3/H_2O_2
3.3	Wet ashing, $HNO_3/HClO_4$
4.1	Pressure digestion, HNO_3,
5.1	Microwave digestion, HNO_3
5.4	Microwave digestion, HNO_3/H_2O_2,
5.5	Microwave digestion, $HNO_3/H_2O_2/HCl$
6.1	Dry ashing, dissolution with HCl
6.2	Dry ashing, dissolution with HNO_3

Code Numbers of Abbreviations of Determination Methods

20	AAS-flame technique
21	AAS-flameless technique
31	AES-ICP
32	ICP+MS
40	X-ray-energy dispersive


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Cd
% dev. from MEAN
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
Evaluation acc. pretreatment methods
6.2-20
6.1-32
5.5-21
5.4-31
5.4-21
5.1-32
5.1-31
5.1-21
4.1-31
4.1-31
4.1-21
4.1-21
4.1-21
3.3-21
3.3-20
3.2-31
2-40


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: Cd
40-2
32-6.1
32-5.1
31-5.4
31-5.1
31-4.1
31-4.1
31-3.2
21-5.5
21-5.4
21-5.1
21-4.1
21-4.1
21-4.1
21-3.3
20-6.2
20-3.3
Evaluation acc. determination methods
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN

2.4.16 Carbon

The detection of carbon is normally no problem with elementaranalysator and the success depends on handling and calibration.

Proposal for Manual-revision:

The methods of following laboratories should be preferred:

Lab Nr.	PC	DC
4	1	10.1
45	1	13

For further interlaboratory studies the tolerable limit can be reduced to ± 5 %.

Method Codes-Carbon

Code Numbers of Abbreviations of Pretreatments

1 **No pretreatment**

3.81 Wet ashing, H_2SO_4/K_2CrO_7

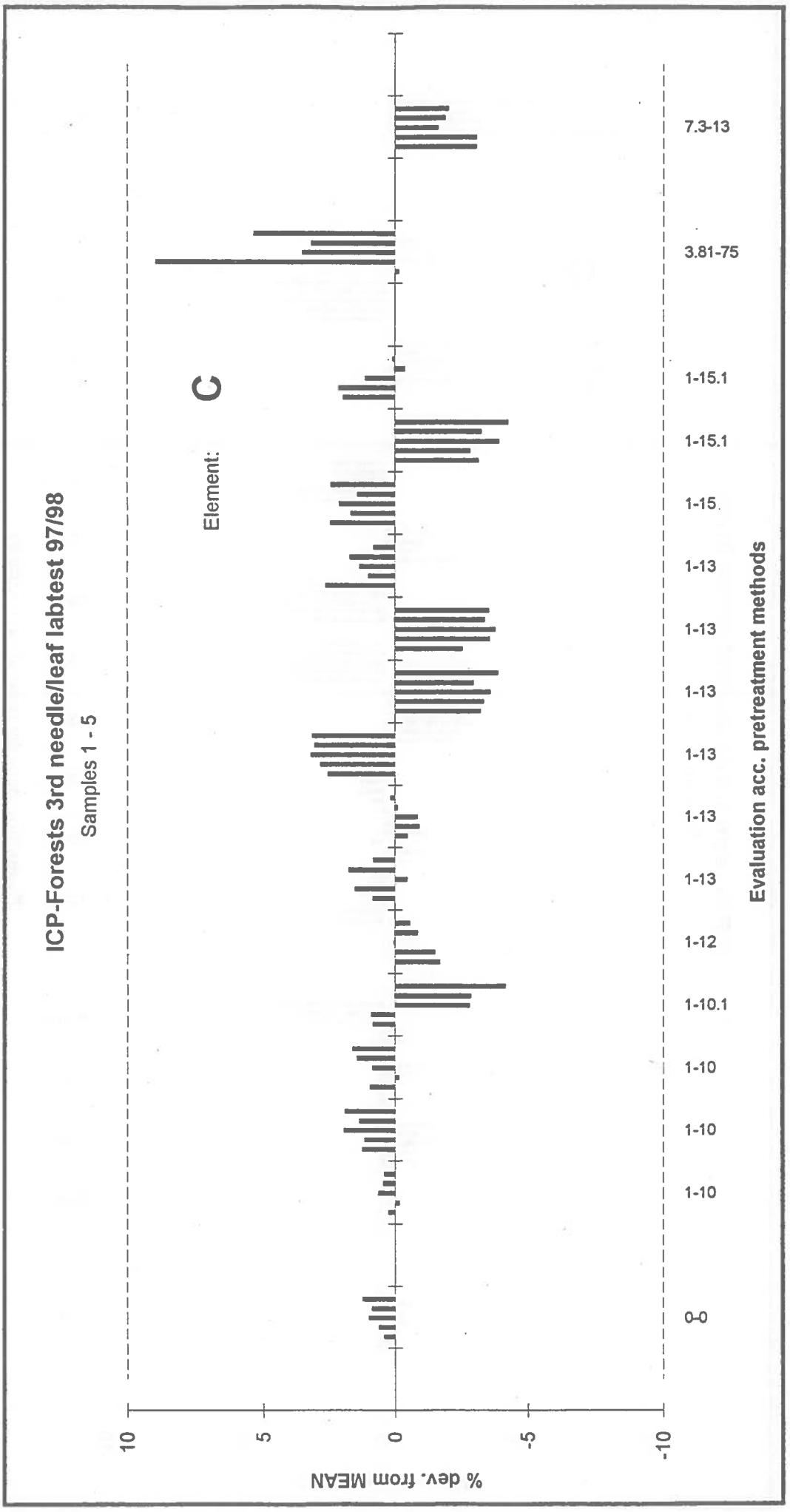
Code Numbers of Abbreviations of Determination-Methods

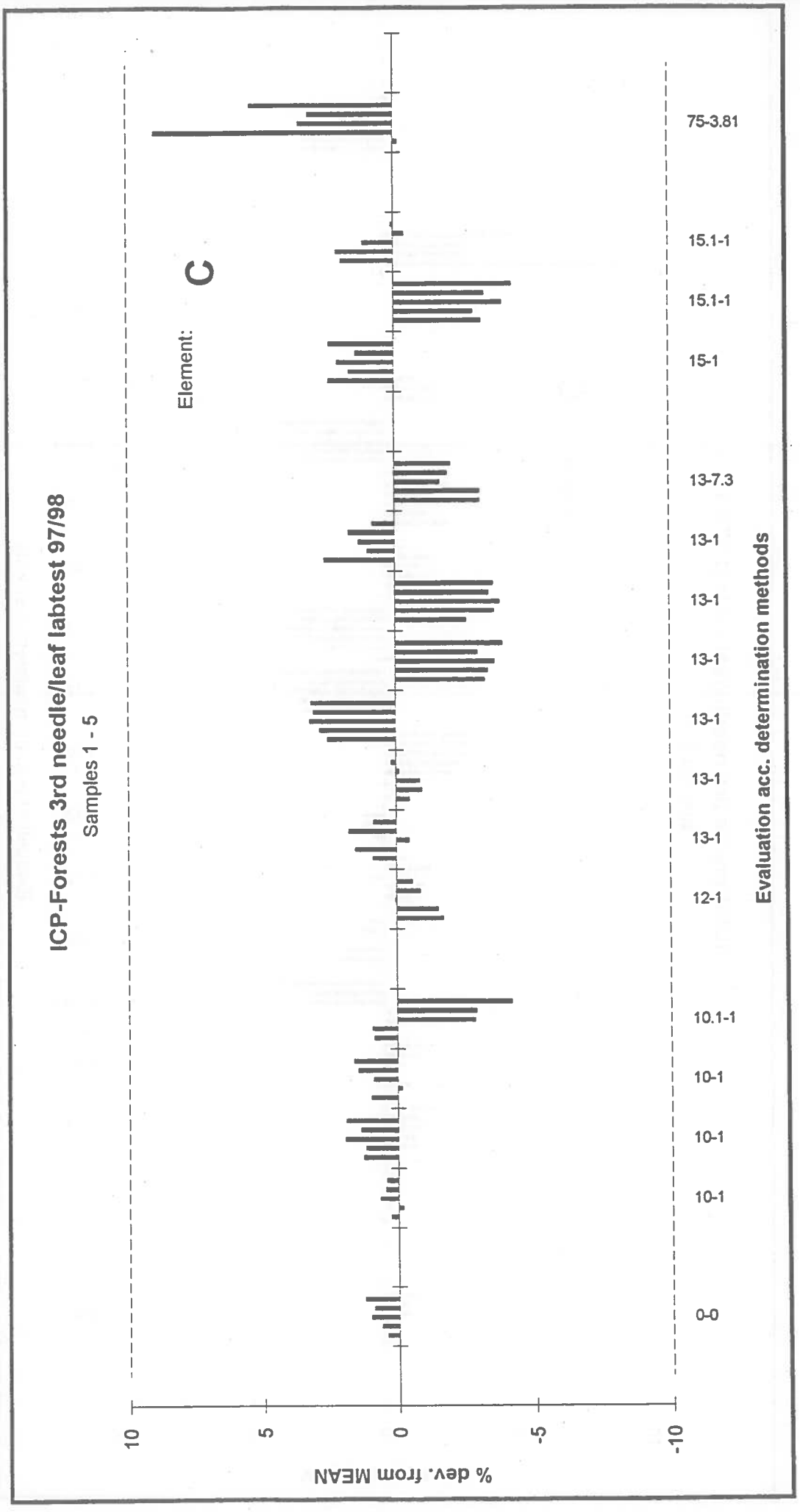
10 Elementar-analyzer
10.1 **Eltra-M**

12 Dinamic Carbon Analyzer Heraeus
13 **Leco**

15 N-Analysator (Heraeus)
15.1 N-Analysator (Vario EL)

75 $FeNH_4SO_4$-Titration


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: C
% dev. from MEAN
10
5
0
-5
-10
Evaluation acc. pretreatment methods
7.3-13
3.81-75
1-15.1
1-15.1
1-15
1-13
1-13
1-13
1-13
1-13
1-13
1-12
1-10.1
1-10
1-10
1-10
0-0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: C
% dev. from MEAN
10
5
0
-5
-10
Evaluation acc. determination methods
75-3.81
15.1-1
15.1-1
15-1
13-7.3
13-1
13-1
13-1
13-1
13-1
13-1
12-1
10.1-1
10-1
10-1
10-1
0-0

2.4.17 Water Content

Some values of moisture determination are gine in **annex, p. 4-3.**
The following **Table 8** is a contribution of Dr. W. Kantor (Lab. Germany no. 7). He studied the determination of water content in foliar material at 80 ^{0} C with regard of the heating time.

Drying Time	Sample 1 Spruce Finland	Sample 2 Pine Finland	Sample3 Spruce Germany	Sample 4 Oak Germany	Sample 5 Beech Slowenia
3^{h}	4.56	4.39	4.92	4.72	5.38
	4.51	4.28	4.83	4.69	5.42
	4.72	4.37	4.79	4.81	5.44
	4.65	4.28	4.81	4.77	5.46
Average	4.61	4.33	4.84	4.75	5.43
Std.-Dev.%	2.03	1.35	1.19	1.12	0.63
6^{h}	4.56	4.42	4.97	4.73	5.45
	4.57	4.31	4.88	4.72	5.54
	4.90	4.55	4.95	4.94	5.65
	4.81	4.49	4.96	4.92	5.61
Average	4.71	4.44	4.94	4.83	5.56
Std.-Dev.%	3.64	2.32	0.83	2.46	1.58
12^{h}	4.57	4.44	4.91	4.64	5.34
	4.55	4.39	4.88	4.63	5.42
	5.01	4.70	5.05	5.05	5.75
	4.91	4.58	5.10	5.07	5.80
Average	4.76	4.53	4.99	4.85	5.58
Std.-Dev.%	4.93	3.10	2.14	5.07	4.15
24^{h}	4.88	4.83	5.26	4.96	5.67
	4.94	4.68	5.12	4.83	5.57
	5.06	4.81	5.12	5.12	5.83
	4.95	4.72	5.19	5.13	5.89
Average	4.96	4.79	5.17	5.01	5.74
Std.-Dev.%	1.51	1.51	1.30	2.86	2.55
48^{h}	4.85	4.8	5.17	4.78	5.49
	4.81	4.69	5.08	4.76	5.53
	5.20	4.96	5.25	5.21	5.94
	5.12	4.90	5.29	5.21	5.98
Average	5.00	4.84	5.20	4.99	5.74
Std.-Dev.%	3.88	2.45	1.79	5.09	4.55

The drying procedure stops within 24 hours.

Proposal for manual revision:

Oven drying at least for 24 h at 80 ° C immediately before starting with analysis.

2.5 Literature

Bartels, U. (1996):	ICP Forests 2nd Needle/Leaf Interlaboratory Test 95/96 Results Landesumweltamt NRW, October 1996
Bartels, U. (1997)	ICP Forests 4$^{Th.}$ Meeting of the Foliar Expert's Panel Vienna 24./25 February 1997 - Discussion of the results of the 2nd interlaboratory test - Additional evaluations and explanations Landesumweltamt NRW, February 1997
Stefan, K. Fürst, A. Hacker, R. Bartels, U. (1997)	Forest Foliar Condition in Europe Results of large-scale foliar chemistry surveys EC-UN/ECE-FBVA, Brussels, Geneva, Vienna
Hampel, F (1980)	Robuste Schätzungen: Ein anwendungsorientierter Überblick Biometrical Journal **22**,1 pp 3-21
Hampel, F (1987)	Einige Aspekte der statistischen Datenanalyse Lebensmittel-Technologie **20**, 5 pp 99-103 Lebensmittel- Technologie **20**, 5 pp 130 - 133
Lischer, P. (1987)	Robuste Ringversuchsauswertung Lebensmittel-Technologie **20**, 7 pp 167-172
Manual (1994)	Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of the effects of air pollution on forests EC-UN/ECE, Hamburg a. Praha
Rocke, D. M (1983)	Robust statistical analysis of interlaboratory studies Biometrica **70**, 2 pp 421-431
Schweizer Lebensmittelbuch (1998)	chapter 60 A (by P. Lischer) pp 37-44, especially 40-42, where the iterative process is explained on which bases the computerprogramme Ring 4.0
Uhlig, St. (1995)	Ring 4.0 - Programm zur Auswertung von Ringversuchen (Manual)

3. Summary

The 3rd needle/leaf interlaboratory study 1997/98 on needles and leaves by participation of about 50 laboratories from 29 European countries lead to some non-uniformed results:

- The determination of some elements like Sulphur, Sodium, Copper, Lead, Boron and Cadmium lead to better result compared with the 2nd test in 1995/96.

- On the other hand the results of some mandatory elements like Phosphorus, Calcium, Magnesium, Potassium and Manganese got worse.

- Some laboratories with „good results" in the 2nd test now produced in some cases data sets with a high number of outlying values and vice versa, but there is also a number of laboratories, which did solid analysis as in the 2nd as in the 3rd run of this interlaboratory study. Their methods should be a basis for revision of the analysis chapter of ICP-Forests manual.

We have to state a growing trend far from classic methods like Kjeldahl digestion, colorimetry, titration or Schöniger combustion to more modern and automatically running systems like ICP, elemental analysers. A minority of laboratories are using X-ray spectroscopy.

It is a noteworthy fact that in comparison of all digestion methods the pressure digestion combustion of foliar produces in most cases the more homogeneous results than the classic wet digestion and the microwave systems or dry ashing methods do. This has to be in mind during manual revision.

The 3rd ring test will be discussed on the next expert panel in Vienna, Sept. 1998. It should initialise:

- Regularly studies with all European laboratories , i.e. all two years with three foliar samples.

- A revision of the chapter 4 of the manual with respect on the present result.

List of participant laboratories and responsible persons
(State: 01.08.1998)

Austria	**Forstliche Bundesversuchsanstalt** **Seckendorff-Gudent-Weg 8** **A-1131 Wien (Vienna)** **Tel: +43-1-87838-144** **Fax: +43-1-8775907**	**Dipl. Ing. A. Fürst**
Austria (UBA)	**Federal Environmental Agency** **Spittelauer Lände 5** **A-1090 Wien (Vienna)** **Tel: +43-1-31304-5106** **Fax:+43-1-31304-5400**	**Dr. Frank**
Belarus	**no participation**	
Belgium 1	**Inst. for Forestry** **and Game Management** **Gaverstraat 4** **B-9500 Geraardsbergen** **Tel: +32-54-437120** **Fax:+32-54-410896**	**Dr. B. De Vos**
Belgium 2	**Universite Catholique de Louvin** **Unite des eaux et forets** **Place Croix Du Sud 2/9** **B-1348 Louvain-La-Neuve** **Tel: +32-10 47 36 98** **Fax:+32-10 47 36 97**	**V.Thierron**
Bulgaria	**University of Forestry** **Ecology and Environm. Protection** **Kl. Ohridski st. 10** **BG-1756 Sofia** **Tel: +359 2 91907 357** **Fax:+359 2 622830**	**Dr. Ekaterina Pavlova**
Croatia	**Forest Research Institute - Ecology** **Cvjetno naselje 41,** **HR-10450 Jastrebarsko** **Tel: +385-1-831022** **Fax:+385-1-831493**	**Dr. N. Komlenovic**
Czech Republic	**Forestry and Game Management** **Research Institute** **Prague 516** **CZ-15604 Jloviste-Strnady** **Tel: +42 2 57921643** **Fax:+42 2 57921276**	**Ing. O. Gubin**

Cyprus	Department of Agriculture Analytical Laboratories CY-1414 Nicosia Tel: +3572-301916 Fax:+3572-781425	Dr. P.Hadjigeorgiou Louki Akrita AV.
Denmark	Danish forest and landscape Forest Ecology Laboratory Hoersholm Kongeveij 11 DK-2970 Hoersholm Tel: +45 4576 3200 Fax:+45 4576 3233	J. Bille-Hansen
Estonia	Estonian Centre of Forest Protection and Silviculture Roomu tee 2 EE-2400 Tartu Tel: +372 7 339397 Fax:+372 7 339464	Endla Asi
Finland	The Finnish Forest Research Institute - Parkano Res. Station Kaironiementie 54 FIN-39700 Parkano Tel: +358-33-44351 Fax:+358-33-4435200	Dr. H. Raitio
France 1	INRA-CRF Centre Recherches Forestieres Seichamps F-54280 Champenoux Tel: +33 3-83394074 Fax:+33 3-83394069	Dr. A. Clement
France 2	INRA-L.E.R.M.A.V.E. Unité d'Agronomie BP 81 F-33883 Villenave d'Ornon Tel: + 33 5-56843071 Fax:+ 33 5-56843073	A. Gomez
Germany 1	Landesumweltamt Nordrhein-Westfalen (LUA) Dienststelle Recklinghausen Leibnizstraße 10 D-45659 Recklinghausen Tel: +49-2361-305519 Fax:+49-2361-305525	Dipl.-Ing. G. Cousen
Germany 3	Institut für Bodenkunde und Waldernährung Büsgenweg 2 D-37077 Göttingen Tel: +49-551 393500 Fax:+49-551-393310	Dr. N. Lammersdorf

Germany 4	Landwirtschaftliche Untersuchungs- und Forschungsanstalt Speyer Abteilung IV Obere Langgasse 40 D-67346 Speyer Tel: +49-6232 136 142 Fax:+49-6232 136 544	Dr. K. Wies
Germany 5	Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg Abt. Bodenkunde und Waldernährung Wonnhaldestraße 4 D-79100 Freiburg Tel: +49-761 4018-176 Fax:+49-761 4018-333	Gabriele Trefz-Malcher
Germany 6	Niedersächsische Forstliche Versuchsanstalt Abt. D, Sachgebiet Umweltanalytik Grätzelstraße 2 D-37079 Göttingen Tel: +49-551/69401 141 Fax:+49-551/69401 160	N. König
Germany 7	Bundesanstalt für Geo-wissenschaften und Rohstoffe (BGR) Geochemie Wasser u. Boden Referat B 4.12 Postfach 510153 D-30631 Hannover Tel: +49-511-643-3587 Fax:+49-511-643-2304	Dr. W. Kantor
Germany 8	Landesamt f. Natur u. Umwelt Dez. 223 Hamburger Chaussee 25 D-24220 Kiel Tel: +49-431 3832515 Fax:+49-431 3832560	Th. Nack
Germany 9	Sächsische Landesanstalt für Forsten Labor Abt. Bodenkunde/Waldernährung Bonnewitzer Str. 34 D-01827 Graupa Tel: +49-3501-542 243 Fax:+49-3501-542 213	F. Symossek
Germany 10	Bayerische Landesanstalt für Wald und Forstwirtschaft Am Hochanger 11 D-85354 Freising Tel: +49-8161/714931 Fax:+49-8161/714971	Frau Mahler

Germany 11	Technische Universität Dresden Institut für Bodenkunde und Standortslehre Pienner Str. 7 D-01737 Tharandt Tel: +49-35203/381387 Fax:+49-35203/381388	Dr. Th. Klinger
Germany 12	Landwirtschaftliche Untersuchungs- und Forschungsanstalt Rostock Graf-Lippe-Str. 1 D-18059 Rostock Tel: +49-381 2030740 Fax:+49-381 2030 790	Dr. W. Sarich
Germany 13	Thüringer Landesanstalt für Landwirtschaft Naumburger Str. 98 D-07743 Jena Tel: +49-3641 683467 Fax:+49-3641 683414	Dr. D. Truckenbrodt
Germany 14	Hessische Landwirtschaftliche Versuchsanstalt (HLVA) Am Versuchsfeld 13 D-34128 Kassel Tel: +49-561 9888-110 Fax:+49-561 9888-300	Dr. R. Ellinghaus
Germany 15	Institut für Bodenökologie und Umweltbewertung Am Teeberg 5 D-29581 Gerdau / Bohlsen Tel: +49-5808 605 Fax +49-5808 614	Dr. H. Meier-Spasche
Germany 16	Forstliche Forschungsanstalt Eberswalde e.V. Alfred-Möller-Str. 1 D-16225 Eberswalde Tel: +3334-65 510 Fax:+3334-65206	Dr. L. Reichelt
Germany 17	Universität des Saarlandes Angewandte Geochemie Zeile 2 D-66125 Saarbrücken Tel: +6897-798 224/222 Fax:+6897-798 206	Dr. Wannemacher Dr. C. Gerber

Greece	Forest Research Institute Forest Soils Terma Alkmanos GR-11528 Athens Tel: +301-7784240 Fax:+301-7784602	Dr. G. Nakos
Hungary	Forest Research Institute P.O. Box 17. H-1277 Budapest Tel: +36-1 326-1769 Fax:+36-1 326-1639	M. Manninger
Iceland	no participation	
Italy 1	LINNAEA ambientes.r.l. Dept. Environmental Biology University of Siena Via della Cerchia I-53100 Siena Tel: +39 577 298834 Fax:+39 577 298806	Dr. C. Leonizio
Italy 2	Instituto Sperimentale Per La Nutrizione Delle Piante Via della Navicella, 2 I-00184 ROMA Tel: +39 6 700 8721 Fax: +39 6 700 5711	Dott.ssa Maria Teresa Dell'abate
Italy 3	Land- u. forstwirtschaftliches Versuchszentrum Laimburg I-39040 Auer (BZ) Tel: +39-471 969550 Fax:+39-471 969599	M. Aichner
Ireland	Coillte Teoranta Coillte Laboratory Newtownmountkennedy CO. Wicklow, Ireland Tel: +01-2011157 Fax:+01-2011199	Dr. R. Mc. Carthy
Latvia	no participation	
Lithuania	Lithuanian Research Institute of Forestry - Department of Ecology and Forestry 4312 KAUNAS Region Girionys Tel: +37 547345 Fax:+37 7 547446	Dr.Laima Skuodiene
Luxemburg	represented by France	

Norway	NISK Norwegian Forest Research Inst. Hogskoleveien 12 N-1432 As Tel: +4764949000 Fax: +476494298	Dr. T. Wickstrom
Poland	Forest Research Institute Chemical Laboratory Sekocin Las PL-05-090 Raszyn Tel: +48-2246 4623 Fax:+48-2222 4935	J. Wojcik
Portugal	Estacao Florestal Nacional Laboratorio de Quimica Rua Do Borja N° 2 P-1350 Lisboa Tel: +3511 601661 Fax:+3511 3973163	Filomena Nobrega
Romania	Institutul De Cercetari si Amenajari Silvice (ICAS) Sos. Stefanesti 128 sector 2 RO-72904 Bucaresti Tel.: +401-2406095 Fax.:+401-2406845	Surdu Aurelia
Russia	SUE „Water Research and Control Center Laboratory of Spectrometry Str. Kavalergardskaya, 42 RUS-193015 Sankt-Petersburg Tel: +7(812) 213-32-57 Fax:+7(812) 274-66-41	E. L.Proletarskaja
Slovakia 1	Forest Research Institute T.G.Masarykova st. 22 SK-96092 Zvolen Tel: +421-855-320 316-8 Fax:+421-855-321 883	Ing. J. Zahornadska
Slovakia 2	Geological Survey of Slovak Rep. Analytical Geochemistry Laboratory Mlynska dolina 1 SK-81704 Bratislava Tel: +421-7 370 5412 Fax:+421-7 371 940	RNDr.R Skrabana

Slovenia	Slovenian Forestry Institute Laboratory for Soil, Foliar and Water Analysis Vecna Pot 2 SLO-61000 Ljubljana Tel: +386 61 123 13 43 Fax:+386 61 273 589	Polona Kalan,MSc
Spain	Departamento de Uso Sostenible del Medio Natural Apartado de Correos 8.111 E-28.080 Madrid Tel: +34-1 347 6737 Fax:+34-1 357 2293	Dr. Maria R. Gonzalez Cascon
Sweden	National Board of Forestry Wijk St. Vallgatan 6 S- 55183 Jönköping Tel: +4636-155759 Fax:+4636-166170	
Switzerland	Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) Zürcherstrasse 111 CH-8903 Birmensdorf Tel: +41 1 739 23 04/14 Fax:+41 1 739 22 15	D. Pezzota W. Landolt
The Netherlands	no participation	
United Kingdom	Forestry Research Agency Environmental Research Alice Holt Lodge Wrecclesham Farnham UK-Surrey GU 10 4 LH Tel: +44-420 22255 Fax:+44 420 23653	E. Ward
Ukraine	Forest Moniroring and Radioecology Laboratory - Ukrainian Scientific Research Institute of Forestry Pushkinskajy 86 UKR-310024 Kharkiv Tel: +380-572-43.15.49 Fax:+380-572-43.25.20	Igor Buksha

Methods Code

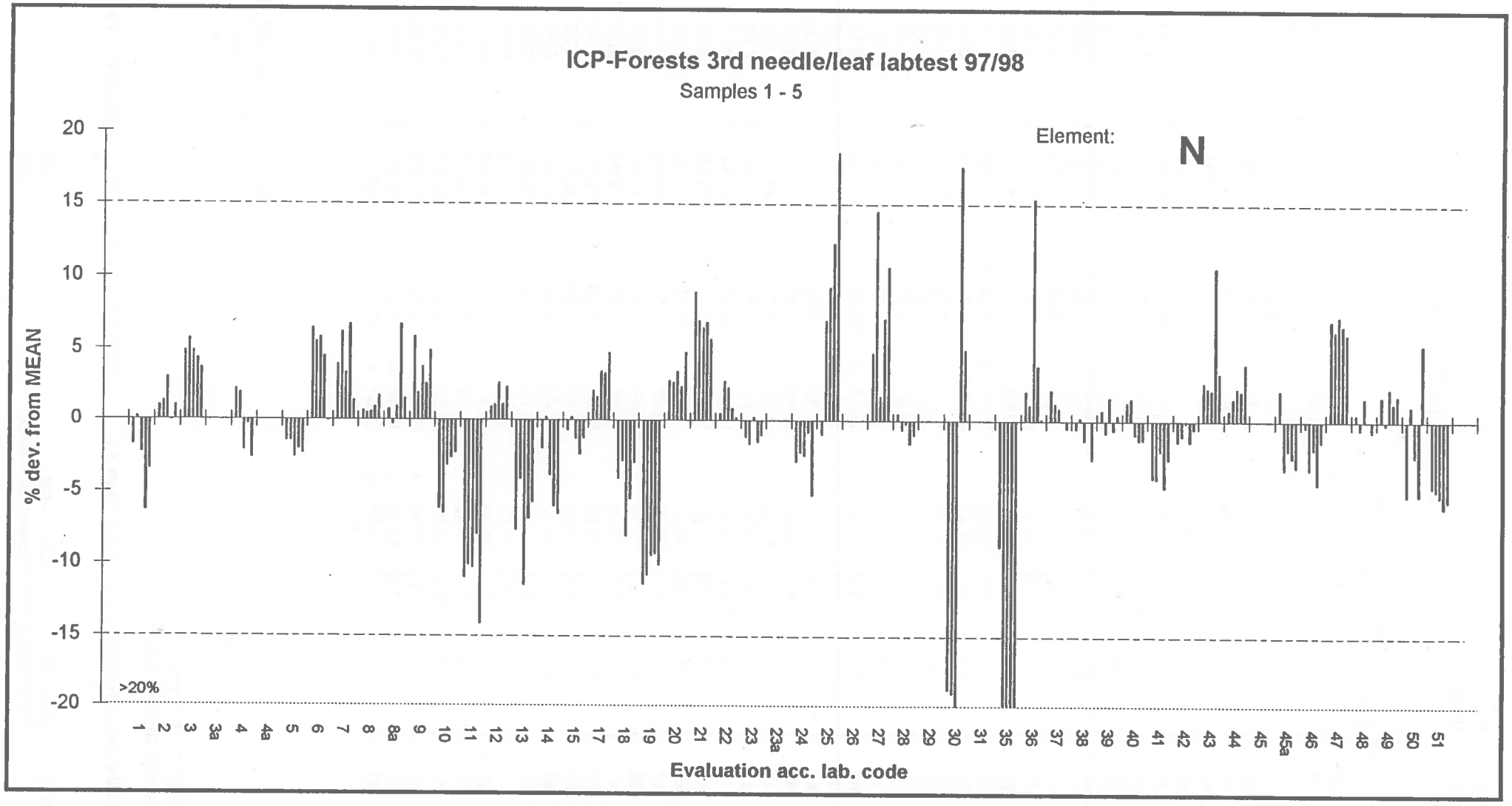
Code Numbers of Abbreviations of Pretreatments

0	No information
1	No pretreatment
2	Pellet
3	Wet ashing,
3.1	Wet ashing, HNO_3
3.2	Wet ashing, HNO_3/H_2O_2
3.3	Wet ashing, $HNO_3/HClO_4$
3.31	Wet ashing HNO3/$HClO_4$/HF
3.4	Wet ashing, $HNO_3/HClO_4/CaCl_2$
3.5	Wet ashing, $HNO_3/HClO_4/H_2O_2$
3.6	Wet ashing, $H_2SO_4/HClO_4$
3.7	Wet ashing, H_2SO_4/HNO_3
3.8	Wet ashing, H_2SO_4/H_2O_2
3.81	Wet ashing, H_2SO_4/K_2CrO_7
3.9	Wet ashing, $H_2SO_4/HNO_3/HClO_4$
3.91	Wet ashing, $HClO_4/H_2O_2$
4	Pressure digestion
4.1	Pressure digestion, HNO_3,
4.2	Pressure digestion, $HNO_3/HClO_4$,
4.3	Pressure digestion, $HNO_3/HClO_4$/HF,
4.4	Pressure digestion, HNO_3/H_2O_2,
5	Microwave digestion
5.1	Microwave digestion, HNO_3,
5.2	Microwave digestion, $HClO_4/HNO_3$,
5.3	Microwave digestion, HF/ HNO_3/H_2O_2,
5.4	Microwave digestion, HNO_3/H_2O_2,
5.5	Microwave digestion, HNO_3/H_2O_2/HCl
5.6	Microwave digestion, HNO_3/HF
6	Dry ashing
6.1	Dry ashing, dissolution with HCl
6.2	Dry ashing, dissolution with HNO_3
6.3	Dry ashing, dissolution with H_2SO_4
6.4	Dry ashing, dissolution with HF/HCl
6.5	Dry ashing, dissolution with HCl/HNO_3
7	Oxygen ashing
7.1	Oxygen ashing, Schöniger
7.2	Oxygen ashing, Wickbold
8	Kjeldahl
8.1	Kjeldahl, H_2SO_4/ Se-catalyst
8.2	Kjeldahl, $H_2SO_4/K_2SO_4/CuSO_4$
8.3	Kjeldahl, H_2SO_4/ H_2O_2
8.4	Kjeldahl, $H_2SO_4/HClO_4$
8.5	Kjeldahl, H_2SO_4/Kjeltab (TiO_2)
8.6	Kjeldahl, H_2SO_4/Pellet(K_2SO_4/Se), H_2O_2
9	Extraction with dil. HNO_3

Methods Code

Code Numbers of Abbreviations of Methods

10	Elementar-analyzer
10.1	Eltra-M
10.2	Carlo Erba CN 1500
11	Sulmhomath 12 ADG, Woesthof (Conductom.)
12	Dinamic Carbon Analyzer Heraeus
13	Leco
14	Kjeldahl-apparatus , Kjeltec (Tecator)
14.1	Kjeldahl-apparatus, (Gerhardt)
14.2	Kjeldahl-apparatus, (Büchi)
15	N-Analysator (Heraeus)
15.1	N-Analysator (Vario EL)
20	AAS-flame technique
21	AAS-flameless technique
30	AES-flame technique/Flame photometer
31	AES-ICP
32	ICP+MS
40	X-ray-energy dispersive
41	X-ray-wavelength dispersive
50	UV-VIS spectrophotometry
51	FIAS
51.1	FIAS, NH_3-Membrane-diffusion, 566 nm
52	Indophenol-blue-method
53	Nessler-method
54	Molybdene-blue-method
55	Vanadium-Mo-blue-method
56	$BaCl_2$-method
57	Azomethin - H
58	Carmine
60	Ion-chromatography
61	Gas-chromatography
70	Titration
71	Turbidimetric titration
72	Conductivity titration
73	NH_4-back titration
74	Thiocyanate-titration
75	$FeNH_4SO_4$-Titration
80	Ion selective Elektrode
85	Gravimetry


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
N
% dev. from MEAN
20
15
10
5
0
-5
-10
-15
-20
>20%
1 2 3 3a 4 4a 5 6 7 8 8a 9 10 11 12 13 14 15 17 18 19 20 21 22 23 23a 24 25 26 27 28 29 30 31 35 36 37 38 39 40 41 42 43 44 45 45a 46 47 48 49 50 51
Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: N
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	30	8.4	14	9.63	a	9.53	a	9.23	ab	9.53 *	0.21	2.20
2	19	1	13	10.10	ab	10.50	a	10.40	a	10.40	0.21	2.02
3	11	8.1	70	10.45	a	10.78	ab	8.75	ab	10.45	1.09	10.43
4	35	8.4	14	10.71	a	10.54	ab	10.87	ab	10.71	0.17	1.59
5	13	8.2	70	10.75	a	10.84	a	10.97	a	10.84	0.11	1.01
6	10	8	70	10.99		10.97		11.24	b	11.01	0.15	1.36
7	50	8.2	14.2	11.10		11.30	b	11.10		11.13	0.12	1.08
8	51	1	13	11.20						11.20		0.00
9	18	3.8	52	11.36		10.73	b	11.26		11.26	0.34	3.02
10	41	1	15.1	11.11	b	11.60	b	11.27		11.27	0.25	2.22
11	24	8.5	14.1	11.20	b	11.60	b	11.40		11.40	0.20	1.75
12	14	8.3	14.1	11.50		11.30	b	11.80	b	11.50	0.25	2.17
13	1	8.1	70	11.43		11.53		11.64		11.53	0.11	0.95
14	5	8.1	70	11.56		11.56		11.56		11.56	0.00	0.00
15	42	1	13	11.47		11.57		11.67		11.57	0.10	0.86
16	23	8.1	70	12.10	b	11.50		11.60		11.60	0.32	2.76
17	25	1	13	11.62		11.45	b	11.79	b	11.62	0.17	1.46
18	15	8.1	14	11.58		11.73		11.65		11.65	0.08	0.69
19	38	1	15	11.70		11.70		11.50	b	11.67	0.12	1.03
20	46	8.2	14	11.69		11.52	b	11.91	b	11.69	0.20	1.71
21	22	0	0	11.80		11.80		11.80		11.80	0.00	0.00
22	28	8.3	52	11.76		11.84		11.80		11.80	0.04	0.34
23	48	1	13	11.80		11.60	b	11.90		11.80	0.15	1.27
24	8	8.6	52	11.65	b	11.85		11.85		11.82	0.12	1.02
25	8a	8.2	14	11.80		11.80		11.90		11.83	0.06	0.51
26	39	1	13	11.80		11.90		11.80		11.83	0.06	0.51
27	44	1	13	11.85		11.79		11.84		11.83	0.03	0.25
28	12	1	10	11.96		11.80		11.83		11.85	0.09	0.76
29	2	8.5	51.1	11.85		11.85		11.87		11.86	0.01	0.08
30	40	1	15	11.90		12.18	b	11.83		11.90	0.19	1.60
31	49	1	10	11.96		11.93		11.95		11.95	0.02	0.17
32	17	8.1	50	11.99		12.07		11.78	b	11.99	0.15	1.25
33	36	8.1	14.1	12.00		12.04		11.94		11.99	0.05	0.42
34	4	1	10.1	12.06		11.96		11.99		12.00	0.05	0.42
35	37	8.1	14	11.95		12.05		12.00		12.00	0.05	0.42
36	45a	1	13	11.60	b	12.10		12.00		12.00	0.26	2.17
37	43	8.1	70	12.06		11.40	b	12.44	b	12.06	0.53	4.39
38	20	1	13	11.97		12.12		12.09		12.07	0.08	0.66
39	7	2	13	11.90	b	12.20		12.40	b	12.20	0.25	2.05
40	27	8.2	14	12.30		12.30		12.29		12.30	0.01	0.08
41	3	1	13	12.42		12.14	b	12.31		12.31	0.14	1.14
42	9	8.2	14.1	12.40		12.50		12.40		12.43	0.06	0.48
43	6	1	10.2	12.48	a	12.76	ab	12.46	a	12.50	0.17	1.36
44	47	1	15	12.59	a	12.46	a	12.61	a	12.57	0.08	0.64
45	21	1	13	12.50	ab	12.80	a	13.20	ab	12.80	0.35	2.73

Mean	Interlab.std. deviation	
	abs.	rel.%
11.74	0.16	1.40

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 15 % from mean (Vienna agreement 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	2.2

ICP-Forests 3rd needle/leaf labtest 97/98

Element: N
Dimension: mg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	35	8.4	14	9.34	a	9.01	ab	9.51	ab	9.34 *	0.25	2.68
2	30	8.4	14	9.52	a	9.84	ab	9.15	ab	9.52 *	0.35	3.68
3	19	1	13	10.70	ab	10.50	a	10.10	ab	10.50	0.31	2.95
4	11	8.1	70	10.74	ab	10.25	ab	10.58	a	10.58	0.25	2.36
5	10	8	70	10.97	a	11.04	a	11.00	a	11.00	0.04	0.36
6	51	1	13	11.20						11.20		0.00
7	13	8.2	70	11.31		11.34		11.13	b	11.28	0.11	0.98
8	41	1	15.1	11.36		11.17		11.31		11.29	0.10	0.89
9	45a	1	13	11.30		11.40		11.40		11.37	0.06	0.53
10	46	8.2	14	11.42		11.31		11.39		11.37	0.06	0.53
11	18	3.8	52	11.47		11.47		10.83	b	11.43	0.37	3.24
12	24	8.5	14.1	11.30	b	11.60		11.50		11.50	0.15	1.30
13	23	8.1	70	11.60		11.50		11.60		11.57	0.06	0.52
14	5	8.1	70	11.60		11.60		11.56		11.59	0.02	0.17
15	42	1	13	11.67		11.67		11.57		11.64	0.06	0.52
16	39	1	13	11.70		11.70		11.60		11.67	0.06	0.51
17	28	8.3	52	11.77		11.66		11.64		11.69	0.07	0.60
18	48	1	13	11.70		11.70		11.70		11.70	0.00	0.00
19	8a	8.2	14	11.80		11.70		11.70		11.73	0.06	0.51
20	49	1	10	11.75		11.78		11.69		11.74	0.05	0.43
21	1	8.1	70	10.88	b	11.88		11.80		11.80	0.56	4.75
22	14	8.3	14.1	11.80		11.60	b	11.90		11.80	0.15	1.27
23	15	8.1	14	11.56	b	11.98	b	11.80		11.80	0.21	1.78
24	38	1	15	11.80		11.90		11.50	b	11.80	0.21	1.78
25	8	8.6	52	11.80		11.80		11.90		11.83	0.06	0.51
26	12	1	10	12.10	b	11.70	b	11.90		11.90	0.20	1.68
27	50	8.2	14.2	12.00		11.90		11.40	b	11.90	0.32	2.69
28	36	8.1	14.1	12.06	b	11.89		11.84		11.91	0.12	1.01
29	37	8.1	14	11.92		11.97		11.87		11.92	0.05	0.42
30	2	8.5	51.1	11.62	b	11.93		12.18	b	11.93	0.28	2.35
31	40	1	15	12.02		11.88		11.97		11.96	0.07	0.59
32	44	1	13	11.86		12.12	b	11.96		11.96	0.13	1.09
33	17	8.1	50	11.89		12.00		12.01		11.97	0.07	0.58
34	4	1	10.1	12.06		11.85	b	12.02		12.00	0.11	0.92
35	9	8.2	14.1	12.00		12.00		12.00		12.00	0.00	0.00
36	43	8.1	70	12.05		13.07	b	11.81	b	12.05	0.67	5.56
37	20	1	13	12.09		11.94	b	12.39	b	12.09	0.23	1.90
38	22	0	0	12.10		11.70	b	12.30	b	12.10	0.31	2.56
39	6	1	10.2	12.47		12.39		12.41		12.42	0.04	0.32
40	3	1	13	12.52		12.34		12.44		12.44	0.09	0.72
41	7	2	13	12.50	a	12.60	a	12.10	ab	12.50	0.26	2.08
42	47	1	15	12.54	a	12.45	a	12.58	a	12.52	0.07	0.56
43	21	1	13	12.20	ab	12.60	a	12.80	ab	12.60	0.31	2.46
44	25	1	13	12.60	a	12.75	ab	12.51	a	12.60	0.12	0.95
45	27	8.2	14	13.45	a	13.50	a	13.50	a	13.48	0.03	0.22

Mean	Interlab.std. deviation	
	abs.	rel.%
11.77	0.16	1.37

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	4.4

ICP-Forests 3rd needle/leaf labtest 97/98

Element: N
Dimension: mg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	35	8.4	14	7.15	ab	6.16	a	6.20	a	6.22 *	0.56	9.00
2	30	8.4	14	10.76	ab	11.43	a	11.57	a	11.43 *	0.43	3.76
3	13	8.2	70	12.71	a	13.39	ab	12.60	a	12.71	0.43	3.38
4	11	8.1	70	12.91	a	12.94	a	12.19	ab	12.88	0.42	3.26
5	19	1	13	13.00	a	12.70	ab	13.30	ab	13.00	0.30	2.31
6	18	3.8	52	12.77	ab	13.20	a	13.42	ab	13.20	0.33	2.50
7	51	1	13	13.60						13.60		0.00
8	14	8.3	14.1	13.80		14.10	b	13.70		13.80	0.21	1.52
9	10	8	70	13.88		13.88		13.94		13.90	0.03	0.22
10	5	8.1	70	13.90		14.10		13.97		13.98	0.10	0.72
11	24	8.5	14.1	13.90		14.10		14.00		14.00	0.10	0.71
12	50	8.2	14.2	13.70	b	14.00		14.20	b	14.00	0.25	1.79
13	1	8.1	70	14.02		14.02		14.02		14.02	0.00	0.00
14	4	1	10.1	13.97		14.10		14.09		14.05	0.07	0.50
15	41	1	15.1	13.90		14.08		14.10		14.05	0.11	0.78
16	45a	1	13	14.10		14.10		13.90	b	14.06	0.12	0.85
17	46	8.2	14	14.09		13.31	b	14.14		14.07	0.47	3.34
18	38	1	15	14.20		14.20		14.00	b	14.16	0.12	0.85
19	15	8.1	14	14.08		14.21		14.21		14.17	0.08	0.56
20	40	1	15	14.22		14.30		13.85	b	14.22	0.24	1.69
21	28	8.3	52	14.29		14.35		14.33		14.32	0.03	0.21
22	42	1	13	14.41		14.31		14.31		14.34	0.06	0.42
23	23	8.1	70	14.40		14.20	b	14.50		14.40	0.15	1.04
24	8	8.6	52	14.43		14.48		14.43		14.45	0.03	0.21
25	37	8.1	14	14.43		14.49		14.55		14.49	0.06	0.41
26	8a	8.2	14	14.50		14.70	b	14.10	b	14.50	0.31	2.14
27	39	1	13	14.60		14.70		14.50		14.60	0.10	0.68
28	48	1	13	14.90	b	14.40	b	14.60		14.60	0.25	1.71
29	27	8.2	14	14.60		14.61		14.61		14.61	0.01	0.07
30	43	8.1	70	14.95	b	14.45	b	14.68		14.68	0.25	1.70
31	22	0	0	14.60		14.70		15.00	b	14.70	0.21	1.43
32	44	1	13	14.77		14.03	b	14.72		14.70	0.41	2.79
33	49	1	10	14.71		14.72		14.68		14.70	0.02	0.14
34	12	1	10	14.76		14.67		14.79		14.74	0.06	0.41
35	2	8.5	51.1	14.69		14.80		14.87		14.79	0.09	0.61
36	7	2	13	14.80		14.80		15.30	b	14.84	0.29	1.95
37	17	8.1	50	14.90		14.89		14.79		14.86	0.06	0.40
38	20	1	13	14.90		14.75		14.90		14.86	0.09	0.61
39	9	8.2	14.1	14.90		15.10	b	14.80		14.90	0.15	1.01
40	3	1	13	15.08		14.99		15.10		15.06	0.06	0.40
41	6	1	10.2	15.72	b	15.20		14.50	b	15.20	0.61	4.01
42	21	1	13	15.30		15.10	b	15.70	b	15.30	0.31	2.03
43	47	1	15	15.35	a	15.41	a	15.59	ab	15.42	0.12	0.78
44	25	1	13	15.70	a	15.88	ab	15.62	a	15.70	0.13	0.83
45	36	8.1	14.1	16.55	a	16.50	a	16.68	a	16.57 *	0.09	0.54

Mean	Interlab.std. deviation	
	abs.	rel.%
14.36	**0.19**	**1.43**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **45**
Percentage of non-tolerable lab means: **6.7**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: N
Dimension: mg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	35	8.4	14	9.05	a	9.00	a	8.97	a	9.01 *	0.04	0.44
2	19	1	13	10.50	a	10.60	a	10.50	a	10.52	0.06	0.57
3	11	8.1	70	10.67		9.86	b	10.80	b	10.67	0.51	4.78
4	13	8.2	70	10.94	b	10.80		10.62	b	10.80	0.16	1.48
5	1	8.1	70	11.48	b	10.86		10.66	b	10.86	0.43	3.96
6	14	8.3	14.1	10.90		11.00		10.80		10.90	0.10	0.92
7	51	1	13	10.90						10.90		0.00
8	18	3.8	52	10.98		10.98		10.13	b	10.96	0.49	4.47
9	50	8.2	14.2	10.90		11.00		11.20	b	11.00	0.15	1.36
10	41	1	15.1	11.16		10.98		11.06		11.06	0.09	0.81
11	46	8.2	14	11.07		11.07		11.46	b	11.09	0.23	2.07
12	10	8	70	11.40		11.13	b	11.29		11.29	0.14	1.24
13	45a	1	13	11.50	b	11.20		11.30		11.30	0.15	1.33
14	15	8.1	14	11.33		11.29		11.35		11.32	0.03	0.27
15	5	8.1	70	11.29		11.36		11.50	b	11.36	0.11	0.97
16	28	8.3	52	11.45		11.40		11.38		11.41	0.04	0.35
17	23	8.1	70	11.40		11.50		11.40		11.42	0.06	0.53
18	42	1	13	11.35		11.45		11.45		11.43	0.06	0.52
19	40	1	15	11.34		11.60	b	11.44		11.44	0.13	1.14
20	24	8.5	14.1	11.40		11.60		11.50		11.50	0.10	0.87
21	39	1	13	11.50		11.70	b	11.50		11.52	0.12	1.04
22	4	1	10.1	11.55		11.57		11.55		11.56	0.01	0.09
23	2	8.5	51.1	11.59		11.49		12.05	b	11.59	0.30	2.59
24	37	8.1	14	11.60		11.55		11.64		11.60	0.05	0.43
25	38	1	15	11.60		11.70		11.40	b	11.60	0.15	1.29
26	48	1	13	11.60		11.60		11.60		11.60	0.00	0.00
27	22	0	0	11.70		11.80		11.60		11.70	0.10	0.85
28	8	8.6	52	11.69		11.69		11.79		11.71	0.06	0.51
29	12	1	10	11.80		11.73		11.43	b	11.73	0.20	1.71
30	49	1	10	11.74		11.72		11.79		11.75	0.04	0.34
31	44	1	13	11.82		11.85		11.89		11.85	0.04	0.34
32	20	1	13	11.90		11.75	b	11.90		11.88	0.09	0.76
33	9	8.2	14.1	11.90		11.90		11.90		11.90	0.00	0.00
34	17	8.1	50	11.96		12.00		12.01		11.99	0.03	0.25
35	36	8.1	14.1	12.11		12.00		12.05		12.05	0.06	0.50
36	3	1	13	12.24	b	11.98	b	12.10		12.10	0.13	1.07
37	6	1	10.2	12.10		12.60	b	12.10		12.12	0.29	2.39
38	7	2	13	12.30		12.40		12.40		12.38	0.06	0.48
39	8a	8.2	14	12.00	b	12.40		12.40		12.38	0.23	1.86
40	47	1	15	12.37		12.35		12.41		12.38	0.03	0.24
41	21	1	13	12.40		12.10	b	12.60	b	12.40	0.25	2.02
42	27	8.2	14	12.43		12.43				12.43	0.00	0.00
43	43	8.1	70	12.84	a	12.80	a	12.95	a	12.84	0.08	0.62
44	25	1	13	13.03	a	13.10	a	12.91	ab	13.03	0.10	0.77
45	30	8.4	14	13.64	a	13.79	ab	12.97	ab	13.64 *	0.44	3.23

Mean	Interlab.std. deviation	
	abs.	rel.%
11.60	**0.14**	**1.14**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**4.4**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**11.65**

Element: N
Dimension: mg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

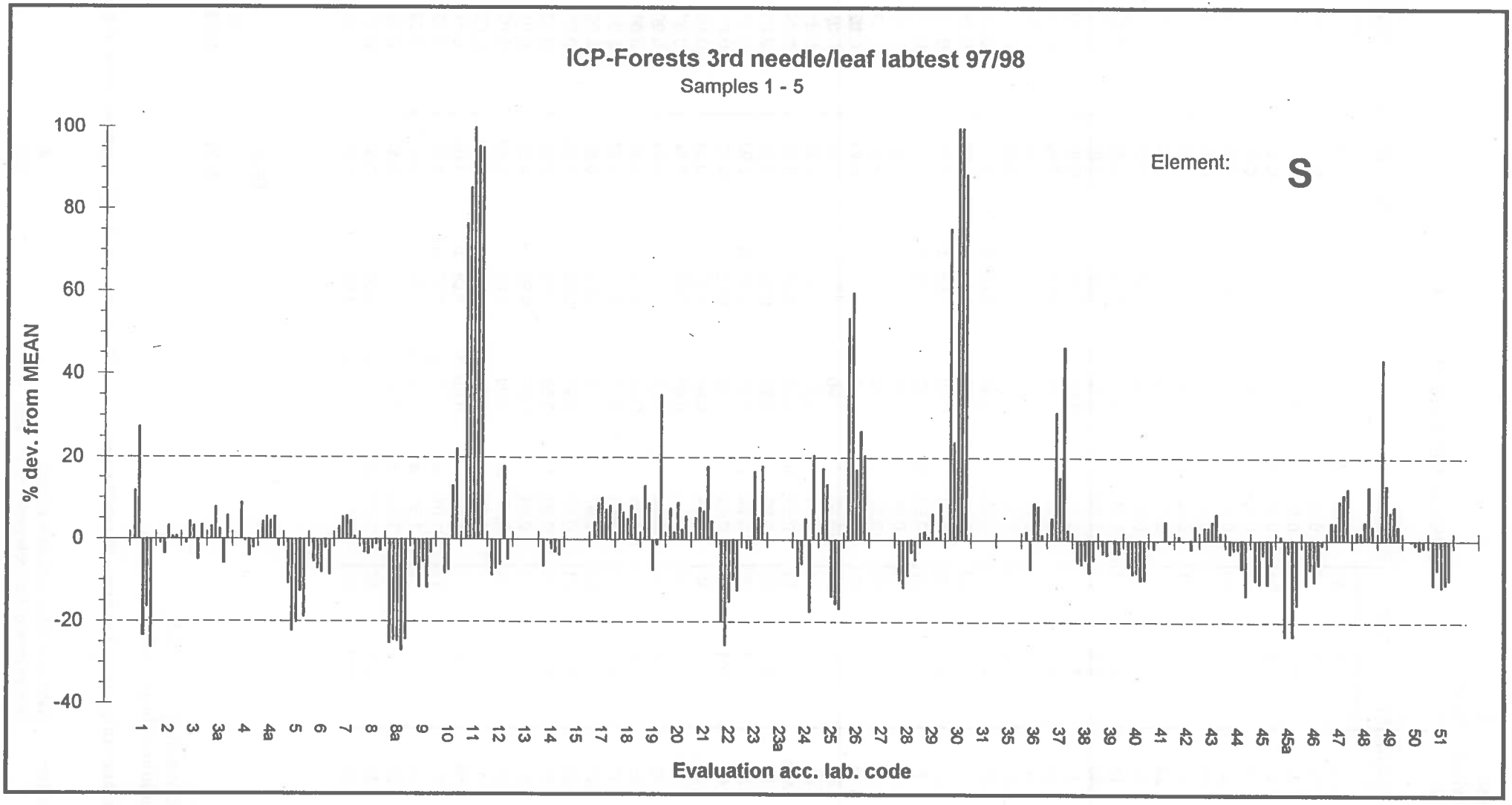
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	35	8.4	14	15.54	a	15.47	a	15.50	a	**15.50**	*	0.04	0.26
2	11	8.1	70	16.86	ab	17.25	a	17.18	a	**17.18**		0.21	1.22
3	19	1	13	18.20	ab	17.80	ab	18.00	a	**18.00**		0.20	1.11
4	14	8.3	14.1	18.70		19.10	b	18.40	b	**18.70**		0.35	1.87
5	13	8.2	70	18.74		18.86		18.99		**18.86**		0.13	0.69
6	51	1	13	18.90						**18.90**			0.00
7	24	8.5	14.1	19.00		18.90		19.00		**18.97**		0.06	0.32
8	1	8.1	70	19.32		18.39	b	19.52	b	**19.32**		0.60	3.11
9	45a	1	13	19.40		19.10	b	19.40		**19.37**		0.17	0.88
10	18	3.8	52	19.64	b	18.66	b	19.42		**19.42**		0.51	2.63
11	38	1	15	19.40		19.50		19.50		**19.47**		0.06	0.31
12	41	1	15.1	19.36		19.47		19.84	b	**19.47**		0.25	1.28
13	4	1	10.1	19.50		19.45		19.50		**19.48**		0.03	0.15
14	5	8.1	70	19.54		19.54		19.54		**19.54**		0.00	0.00
15	10	8	70	19.32	b	19.59		19.58		**19.55**		0.15	0.77
16	46	8.2	14	19.29	b	19.78		19.73		**19.72**		0.27	1.37
17	40	1	15	19.82		19.75		19.58	b	**19.75**		0.12	0.61
18	15	8.1	14	19.79		19.74		19.74		**19.76**		0.03	0.15
19	23	8.1	70	19.70		19.90		19.80		**19.80**		0.10	0.51
20	28	8.3	52	19.79		19.82		19.83		**19.81**		0.02	0.10
21	48	1	13	19.80		19.90		19.90		**19.87**		0.06	0.30
22	42	1	13	19.93		19.93		19.83		**19.90**		0.06	0.30
23	37	8.1	14	19.94		19.88		19.91		**19.91**		0.03	0.15
24	6	1	10.2	20.20	b	19.70	b	20.00		**20.00**		0.25	1.25
25	36	8.1	14.1	19.85	b	20.20	b	20.05		**20.05**		0.18	0.90
26	22	0	0	20.10		19.90	b	20.10		**20.07**		0.12	0.60
27	39	1	13	19.90	b	20.10		20.30	b	**20.10**		0.20	1.00
28	2	8.5	51.1	20.21		20.18		21.63	b	**20.23**		0.83	4.10
29	7	2	13	20.30		19.90	b	20.60	b	**20.30**		0.35	1.72
30	8a	8.2	14	20.40		20.30		20.30		**20.33**		0.06	0.30
31	8	8.6	52	20.34		20.45		20.34		**20.37**		0.06	0.29
32	49	1	10	20.40		20.35		20.41		**20.39**		0.03	0.15
33	12	1	10	20.51		20.53		20.29	b	**20.49**		0.13	0.63
34	43	8.1	70	19.96	b	20.80		20.70		**20.70**		0.46	2.22
35	3	1	13	20.72		20.75		20.78		**20.75**		0.03	0.14
36	44	1	13	20.83		20.76		20.96		**20.83**		0.10	0.48
37	17	8.1	50	20.89		20.97		21.09		**20.97**		0.10	0.48
38	20	1	13	20.48	b	21.23	b	20.98		**20.98**		0.38	1.81
39	9	8.2	14.1	21.20	b	21.00		20.90		**21.00**		0.15	0.71
40	30	8.4	14	21.04		20.34	b	21.06		**21.02**		0.41	1.95
41	50	8.2	14.2	20.70	b	21.10		21.40	b	**21.10**		0.35	1.66
42	21	1	13	20.90	b	21.20		21.20		**21.17**		0.17	0.80
43	47	1	15	21.16		21.27		21.29		**21.25**		0.07	0.33
44	27	8.2	14	22.17	a	22.17	a	22.18	a	**22.17**		0.01	0.05
45	25	1	13	23.74	a	23.90	ab	23.51	ab	**23.74**	*	0.20	0.84

Mean	Interlab.std. deviation	
	abs.	rel.%
20.02	**0.18**	**0.90**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**4.4**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
S
% dev. from MEAN
100
80
60
40
20
0
-20
-40
1
2
3
3a
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Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: S
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	8a	3.31	31	0.68 a	0.67 a	0.69 a	0.68 *	0.01	1.47
2	22	0	0	0.79 ab	0.67 ab	0.73 a	0.73	0.06	8.22
3	5	3.3	71	0.65 b	0.85 b	0.81	0.81	0.11	13.58
4	46	5.6	31	0.77 b	0.81	0.85 b	0.81	0.04	4.94
5	51	2	41	0.82	0.80	0.82	0.81	0.01	1.23
6	28	6	60	0.83	0.82	0.81	0.82	0.01	1.22
7	45	3.3	31	0.82	0.82	0.83	0.82	0.01	1.22
8	12	5.1	31	0.81 b	0.84	0.85	0.83	0.02	2.41
9	24	3.3	71	0.77 b	0.85	0.84	0.83	0.04	4.82
10	9	5.1	31	0.86	0.85	0.85	0.85	0.01	1.18
11	14	4.1	31	0.86	0.87	0.82 b	0.85	0.03	3.53
12	40	5.5	31	0.85	0.82 b	0.87	0.85	0.03	3.53
13	6	5.6	31	0.86	0.86	0.86	0.86	0.00	0.00
14	38	4.3	31	0.89 b	0.85	0.84	0.86	0.03	3.49
15	8	3.91	31	0.87	0.88	0.88	0.88	0.01	1.14
16	39	5	31	0.89	0.87	0.89	0.88	0.01	1.14
17	44	4.1	31	0.98 b	0.88	0.85 b	0.88	0.07	7.95
18	23	3.3	50	0.90	0.77 b	0.91	0.89	0.08	8.99
19	41	4.1	31	0.91	0.90	0.85 b	0.89	0.03	3.37
20	2	5.2	31	0.93 b	0.90	0.79 b	0.90	0.07	7.78
21	3	1	13	0.90	0.89	0.92	0.90	0.02	2.22
22	4	2	40	0.92	0.90	0.91	0.91	0.01	1.10
23	10	3.3	71	0.93	0.89	0.91	0.91	0.02	2.20
24	50	4.1	31	0.90	0.90	0.92	0.91	0.01	1.10
25	42	4.1	31	0.91	0.92	0.92	0.92	0.01	1.09
26	45a	1	13	0.87 b	0.94	0.92	0.92	0.04	4.35
27	29	5.1	31	0.92	0.94	0.94	0.93	0.01	1.08
28	36	6.1	56	0.90 b	0.93	0.97 b	0.93	0.04	4.30
29	48	4.1	31	0.94	0.93	0.93	0.93	0.01	1.08
30	3a	1	13	0.94	0.94	0.93	0.94	0.01	1.06
31	7	3.2	31	0.93	0.95	0.95	0.94	0.01	1.06
32	43	4.1	31	0.94	0.94	0.94	0.94	0.00	0.00
33	4a	2	41	0.95	0.95	0.94	0.95	0.01	1.05
34	17	5.4	31	0.94	0.95	0.95	0.95	0.01	1.05
35	47	4.1	31	0.97	0.95	0.94	0.95	0.02	2.11
36	21	5.4	31	0.95	0.97	0.96	0.96	0.01	1.04
37	37	5.4	31	0.93 b	0.96	0.98	0.96	0.03	3.13
38	20	1	13	0.98	0.97	0.99	0.98	0.01	1.02
39	18	5.4	31	0.92 b	1.00	1.00	0.99	0.05	5.05
40	1	1	13	1.00	1.06 b	1.02	1.02	0.03	2.94
41	19	1	10.1	1.03	0.95 b	1.08 b	1.03	0.07	6.80
42	25	1	13	1.07 a	1.10 ab	1.05 a	1.07	0.03	2.80
43	49	1	10	1.31 a	1.32 a	1.29 a	1.31 *	0.02	1.53
44	26	3.2	32	1.42 a	1.40 a	1.38 a	1.40 *	0.02	1.43
45	30	3.3	50	1.62 a	1.50 ab	1.61 a	1.60 *	0.07	4.38
46	11	3.3	50	1.61 a	1.73 ab	1.56 ab	1.61 *	0.09	5.59

Mean	Interlab.std. deviation	
	abs.	rel.%
0.91	0.03	3.08

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	46
	Percentage of non-tolerable lab means:	10.9

ICP-Forests 3rd needle/leaf labtest 97/98

Element: S
Dimension: mg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	22	0	0	0.72 ab	0.63 ab	0.64 a	0.64 *	0.05	7.81
2	8a	3.31	31	0.64 ab	0.66 ab	0.65 a	0.65 *	0.01	1.54
3	45a	1	13	0.66 a	0.63 ab	0.68 ab	0.66 *	0.03	4.55
4	5	3.3	71	0.65 ab	0.68 ab	0.67 a	0.67 *	0.02	2.99
5	9	5.1	31	0.76	0.76	0.76	0.76	0.00	0.00
6	28	6	60	0.76	0.75 b	0.76	0.76	0.01	1.32
7	45	3.3	31	0.77	0.77	0.77	0.77	0.00	0.00
8	10	3.3	71	0.88 b	0.76 b	0.79	0.79	0.06	7.59
9	40	5.5	31	0.77 b	0.79	0.82 b	0.79	0.03	3.80
10	6	5.6	31	0.81 b	0.80	0.80	0.80	0.01	1.25
11	12	5.1	31	0.80	0.79 b	0.84 b	0.80	0.03	3.75
12	36	6.1	56	0.80	0.80	0.76 b	0.80	0.02	2.50
13	46	5.6	31	0.78 b	0.80	0.85 b	0.80	0.04	5.00
14	51	2	41	0.80	0.80	0.79 b	0.80	0.01	1.25
15	24	3.3	71	0.81	0.75 b	0.82 b	0.81	0.04	4.94
16	38	4.3	31	0.81	0.76 b	0.83 b	0.81	0.04	4.94
17	2	5.2	31	0.83	0.68 b	0.83	0.83	0.09	10.84
18	8	3.91	31	0.84 b	0.83	0.83	0.83	0.01	1.20
19	39	5	31	0.83	0.83	0.82 b	0.83	0.01	1.20
20	23	3.3	50	0.80 b	0.84	0.89 b	0.84	0.05	5.95
21	44	4.1	31	0.89 b	0.76 b	0.84	0.84	0.07	8.33
22	14	4.1	31	0.86	0.87 b	0.81 b	0.86	0.03	3.49
23	41	4.1	31	0.85 b	0.86	0.88 b	0.86	0.02	2.33
24	42	4.1	31	0.86	0.86	0.87 b	0.86	0.01	1.16
25	50	4.1	31	0.86	0.86	0.89 b	0.86	0.02	2.33
26	29	5.1	31	0.87	0.89 b	0.87	0.87	0.01	1.15
27	20	1	13	0.88	0.86 b	0.88	0.88	0.01	1.14
28	48	4.1	31	0.91 b	0.88	0.88	0.88	0.02	2.27
29	43	4.1	31	0.89	0.90 b	0.89	0.89	0.01	1.12
30	3	1	13	0.90	0.91 b	0.88 b	0.90	0.02	2.22
31	47	4.1	31	0.90	0.90	0.87 b	0.90	0.02	2.22
32	4a	2	41	0.91	0.91	0.88 b	0.91	0.02	2.20
33	7	3.2	31	0.91	0.92 b	0.91	0.91	0.01	1.10
34	18	5.4	31	0.94 b	0.92	0.92	0.92	0.01	1.09
35	3a	1	13	0.93	0.91 b	0.95 b	0.93	0.02	2.15
36	21	5.4	31	0.92 b	0.93	0.93	0.93	0.01	1.08
37	4	2	40	0.94	0.95 b	0.94	0.94	0.01	1.06
38	17	5.4	31	0.94	0.93 b	0.95 b	0.94	0.01	1.06
39	19	1	10.1	0.94	0.99 b	0.92 b	0.94	0.04	4.26
40	25	1	13	0.99 b	0.98	0.92 b	0.98	0.04	4.08
41	49	1	10	0.98	0.98	0.95 b	0.98	0.02	2.04
42	30	3.3	50	1.06 ab	1.07 a	1.11 ab	1.07 *	0.03	2.80
43	1	1	13	0.96 ab	1.13 ab	1.10 a	1.10 *	0.09	8.18
44	37	5.4	31	1.09 ab	1.15 ab	1.13 a	1.13 *	0.03	2.65
45	26	3.2	32	1.39 ab	1.33 ab	1.38 a	1.38 *	0.03	2.17
46	11	3.3	50	1.60 a	1.45 ab	1.76 ab	1.60 *	0.16	10.00

Mean	Interlab.std. deviation	
	abs.	rel.%
0.86	**0.03**	**3.18**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **46**
Percentage of non-tolerable lab means: **19.6**

Element: S
Dimension: mg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	8a	3.31	31	1.21	a	1.16	a	1.18	a	1.18 *	0.03	2.54
2	1	1	13	1.20	a	1.22	a	1.18	a	1.20 *	0.02	1.67
3	5	3.3	71	1.48	ab	1.25	a	0.77	ab	1.25 *	0.36	28.80
4	22	0	0	1.49	ab	1.33	a	1.30	a	1.33	0.10	7.52
5	25	1	13	1.37		1.35		1.32		1.35	0.03	2.22
6	51	2	41	1.41		1.32	b	1.40		1.39	0.05	3.60
7	46	5.6	31	1.30	b	1.41		1.43		1.41	0.07	4.96
8	28	6	60	1.41		1.45		1.42		1.43	0.02	1.40
9	6	5.6	31	1.43		1.46		1.44		1.44	0.02	1.39
10	40	5.5	31	1.43		1.45		1.44		1.44	0.01	0.69
11	10	3.3	71	1.45		1.33	b	1.69	b	1.45	0.18	12.41
12	19	1	10.1	1.43		1.45		1.47		1.45	0.02	1.38
13	12	5.1	31	1.46		1.47		1.47		1.47	0.01	0.68
14	9	5.1	31	1.49		1.49		1.46		1.48	0.02	1.35
15	38	4.3	31	1.52		1.49		1.46		1.49	0.03	2.01
16	45	3.3	31	1.52		1.49		1.51		1.51	0.02	1.32
17	45a	1	13	1.52		1.55		1.42	b	1.52	0.07	4.61
18	8	3.91	31	1.55		1.52		1.53		1.53	0.02	1.31
19	14	4.1	31	1.53		1.52		1.55		1.53	0.02	1.31
20	44	4.1	31	1.62	b	1.52		1.52		1.53	0.06	3.92
21	50	4.1	31	1.58	b	1.54		1.53		1.55	0.03	1.94
22	4	2	40	1.56		1.59		1.52	b	1.56	0.04	2.56
23	39	5	31	1.56		1.57		1.58		1.57	0.01	0.64
24	41	4.1	31	1.57		1.56		1.59		1.57	0.02	1.27
25	42	4.1	31	1.56		1.57		1.58		1.57	0.01	0.64
26	3a	1	13	1.53	b	1.64		1.61		1.61	0.06	3.73
27	2	5.2	31	1.12	b	1.62		1.70	b	1.62	0.31	19.14
28	3	1	13	1.62		1.59		1.64		1.62	0.03	1.85
29	4a	2	41	1.66		1.65		1.59	b	1.64	0.04	2.44
30	43	4.1	31	1.65		1.63		1.64		1.64	0.01	0.61
31	48	4.1	31	1.63		1.64		1.64		1.64	0.01	0.61
32	18	5.4	31	1.62		1.65		1.72	b	1.65	0.05	3.03
33	24	3.3	71	1.57	b	1.76	b	1.65		1.65	0.10	6.06
34	7	3.2	31	1.65		1.67		1.66		1.66	0.01	0.60
35	29	5.1	31	1.64		1.68		1.68		1.67	0.02	1.20
36	21	5.4	31	1.67		1.68		1.68		1.68	0.01	0.60
37	49	1	10	1.66		1.68		1.71		1.68	0.03	1.79
38	20	1	13	1.70		1.71		1.72		1.71	0.01	0.58
39	36	6.1	56	1.71		1.68		1.74		1.71	0.03	1.75
40	47	4.1	31	1.75		1.72		1.70		1.72	0.03	1.74
41	17	5.4	31	1.73		1.72		1.73		1.73	0.01	0.58
42	37	5.4	31	1.81	a	1.85	ab	1.78	a	1.81	0.04	2.21
43	23	3.3	50	1.88	ab	1.83	a	1.79	ab	1.83	0.05	2.73
44	26	3.2	32	1.83	a	2.09	ab	1.83	a	1.84	0.15	8.15
45	11	3.3	50	3.44	a	3.40	ab	3.46	a	3.44 *	0.03	0.87
46	30	3.3	50	4.44	ab	4.36	a	4.36	a	4.37 *	0.05	1.14

Mean	Interlab.std. deviation	
	abs.	rel.%
1.57	0.05	3.34

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	46
	Percentage of non-tolerable lab means:	10.9

ICP-Forests 3rd needle/leaf labtest 97/98

Element: S
Dimension: mg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	8a	3.31	31	0.76	a	0.75	a	0.76	a	0.76 *	0.01	1.32
2	45a	1	13	0.80	a	0.80	a	0.79	a	0.80 *	0.01	1.25
3	24	3.3	71	0.72	b	0.87		0.87		0.86	0.09	10.47
4	1	1	13	0.84	b	0.87		0.94	b	0.87	0.05	5.75
5	25	1	13	0.89		0.84	b	0.90		0.88	0.03	3.41
6	5	3.3	71	0.63	b	0.91		0.95	b	0.91	0.17	18.68
7	9	5.1	31	0.88	b	0.96	b	0.92		0.92	0.04	4.35
8	45	3.3	31	0.94		0.92		0.93		0.93	0.01	1.08
9	51	2	41	0.94		0.94		0.92		0.93	0.01	1.08
10	22	0	0	0.94		0.95		0.93		0.94	0.01	1.06
11	40	5.5	31	0.92		0.95		0.94		0.94	0.02	2.13
12	38	4.3	31	0.92	b	0.98		0.96		0.96	0.03	3.13
13	44	4.1	31	0.97		0.92	b	1.01	b	0.97	0.05	5.15
14	3a	1	13	0.94	b	0.99		0.99		0.98	0.03	3.06
15	46	5.6	31	0.97		1.02	b	0.96		0.98	0.03	3.06
16	3	1	13	0.99		0.98		0.99		0.99	0.01	1.01
17	4	2	40	0.99		0.99		1.02		1.00	0.02	2.00
18	14	4.1	31	1.01		0.97	b	1.04	b	1.01	0.04	3.96
19	28	6	60	1.02		1.02		0.98	b	1.01	0.02	1.98
20	39	5	31	1.01		1.00		1.03		1.01	0.02	1.98
21	6	5.6	31	1.02		1.01		1.02		1.02	0.01	0.98
22	42	4.1	31	1.01		1.03		1.02		1.02	0.01	0.98
23	50	4.1	31	1.02		1.02		1.03		1.02	0.01	0.98
24	8	3.91	31	1.03		1.03		1.04		1.03	0.01	0.97
25	19	1	10.1	1.05		1.03		0.92	b	1.03	0.07	6.80
26	2	5.2	31	1.03		1.05		1.08	b	1.05	0.03	2.86
27	29	5.1	31	1.02	b	1.05		1.09	b	1.05	0.04	3.81
28	20	1	13	1.07		1.06		1.08		1.07	0.01	0.93
29	7	3.2	31	1.07		1.10		1.09		1.09	0.02	1.83
30	41	4.1	31	1.08		1.09		1.10		1.09	0.01	0.92
31	4a	2	41	1.11		1.10		1.09		1.10	0.01	0.91
32	23	3.3	50	1.10		1.16	b	1.03	b	1.10	0.07	6.36
33	43	4.1	31	1.11		1.11		1.12		1.11	0.01	0.90
34	17	5.4	31	1.10		1.13		1.14		1.12	0.02	1.79
35	18	5.4	31	1.13		1.13		1.13		1.13	0.00	0.00
36	36	6.1	56	1.13		1.08	b	1.15		1.13	0.04	3.54
37	49	1	10	1.13		1.16	b	1.09	b	1.13	0.04	3.54
38	47	4.1	31	1.16		1.16		1.15		1.16	0.01	0.86
39	10	3.3	71	1.19		1.17		1.19		1.18	0.01	0.85
40	48	4.1	31	1.19		1.15	b	1.19		1.18	0.02	1.69
41	12	5.1	31	1.24		1.18	b	1.24		1.23	0.03	2.44
42	21	5.4	31	1.23		1.23		1.24		1.23	0.01	0.81
43	26	3.2	32	1.11	ab	1.32	a	1.37	ab	1.32 *	0.14	10.61
44	37	5.4	31	1.48	ab	1.53	a	1.57	ab	1.53 *	0.05	3.27
45	11	3.3	50	2.04	a	1.98	ab	2.07	ab	2.04 *	0.05	2.45
46	30	3.3	50	2.34	a	2.44	ab	2.01	ab	2.34 *	0.23	9.83

Mean	Interlab.std. deviation	
	abs.	rel.%
1.04	0.04	3.19

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	46
	Percentage of non-tolerable lab means:	13.0
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	0.98

Element: S
Dimension: mg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

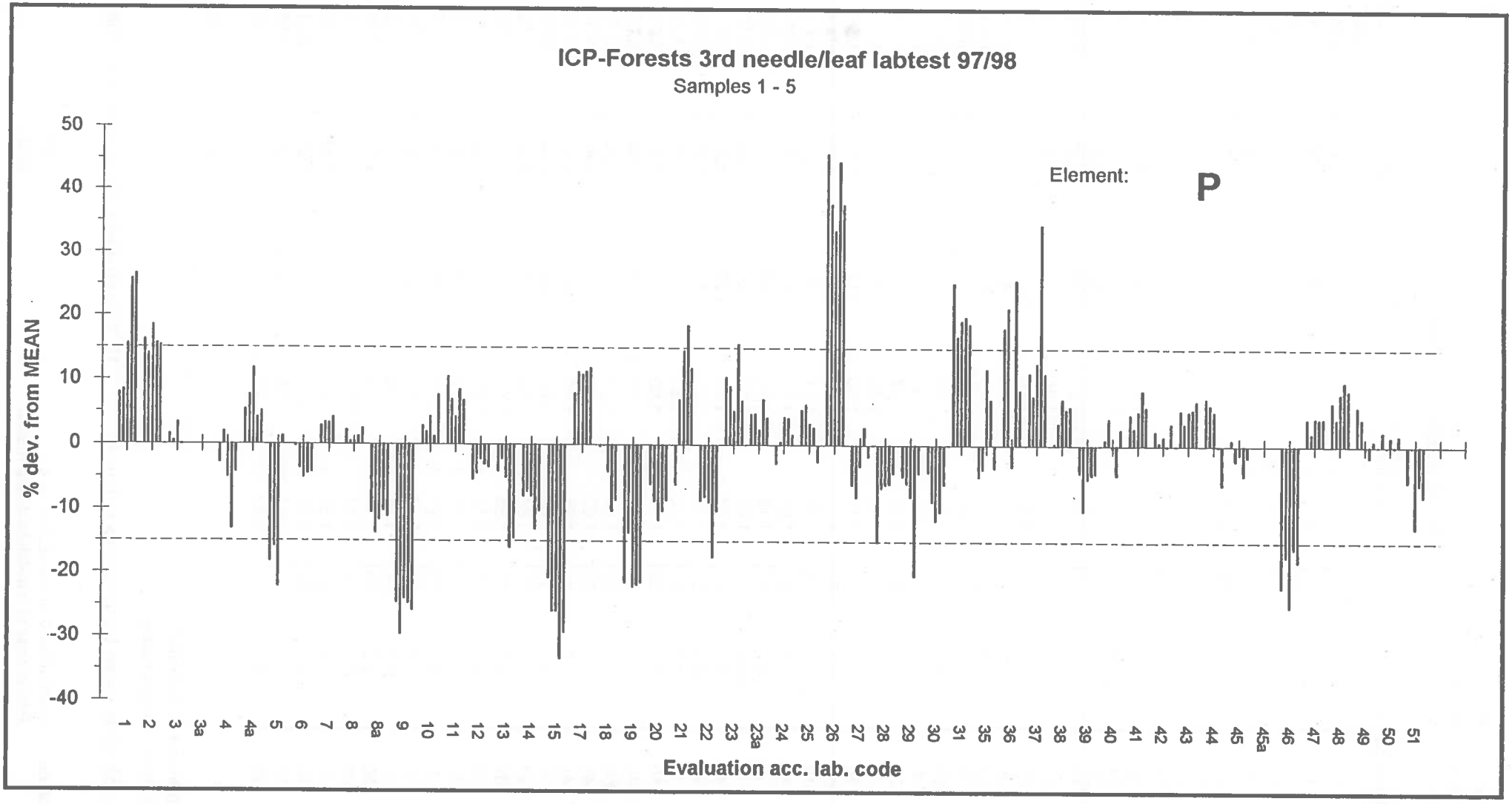
No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	1	1	13	1.13 ab	1.39 a	1.37 a	1.37 *	0.14	10.22
2	8a	3.31	31	1.41 a	1.42 a	1.41 a	1.41 *	0.01	0.71
3	5	3.3	71	1.51 a	1.57 ab	1.40 ab	1.51	0.09	5.96
4	25	1	13	1.58	1.55	1.51	1.55	0.04	2.58
5	45a	1	13	1.54	1.59	1.57	1.57	0.03	1.91
6	44	4.1	31	1.61	1.85 b	1.58	1.61	0.15	9.32
7	22	0	0	1.73 b	1.63	1.52 b	1.63	0.11	6.75
8	40	5.5	31	1.64	1.68	1.70	1.68	0.03	1.79
9	51	2	41	1.66	1.70	1.68	1.68	0.02	1.19
10	6	5.6	31	1.71	1.69	1.70	1.70	0.01	0.59
11	45	3.3	31	1.76	1.76	1.73	1.75	0.02	1.14
12	12	5.1	31	1.75	1.76	1.86 b	1.77	0.06	3.39
13	28	6	60	1.77	1.84 b	1.73	1.77	0.06	3.39
14	38	4.3	31	1.77	1.77	1.78	1.77	0.01	0.56
15	14	4.1	31	1.80	1.72 b	1.81	1.79	0.05	2.79
16	9	5.1	31	1.80	1.82	1.73 b	1.80	0.05	2.78
17	39	5	31	1.80	1.80	1.81	1.80	0.01	0.56
18	8	3.91	31	1.80	1.80	1.83	1.81	0.02	1.10
19	4	2	40	1.82	1.83	1.81	1.82	0.01	0.55
20	4a	2	41	1.84	1.83	1.81	1.83	0.02	1.09
21	50	4.1	31	1.82	1.81	1.89 b	1.83	0.04	2.19
22	46	5.6	31	1.76 b	1.84	1.90 b	1.84	0.07	3.80
23	41	4.1	31	1.84	1.86	1.84	1.85	0.01	0.54
24	2	5.2	31	1.86	1.89	1.89	1.88	0.02	1.06
25	7	3.2	31	1.85	1.88	1.90	1.88	0.03	1.60
26	36	6.1	56	1.87	1.88	1.95 b	1.89	0.04	2.12
27	43	4.1	31	1.91	1.92	1.88	1.90	0.02	1.05
28	37	5.4	31	1.91	1.93	1.88	1.91	0.03	1.57
29	3	1	13	1.94	1.89	1.94	1.93	0.03	1.55
30	42	4.1	31	1.91	1.93	1.94	1.93	0.02	1.04
31	48	4.1	31	1.92	1.94	1.92	1.93	0.01	0.52
32	49	1	10	1.92	1.93	1.95	1.93	0.02	1.04
33	21	5.4	31	1.95	1.96	1.94	1.95	0.01	0.51
34	3a	1	13	1.97	1.89 b	2.05 b	1.97	0.08	4.06
35	20	1	13	1.92 b	1.98	1.99	1.97	0.04	2.03
36	18	5.4	31	1.95	1.98	2.00	1.98	0.03	1.52
37	17	5.4	31	1.98	2.06	2.02	2.02	0.04	1.98
38	29	5.1	31	2.04	2.04	2.01	2.03	0.02	0.99
39	47	4.1	31	2.10	2.15 b	2.08	2.10	0.04	1.90
40	23	3.3	50	2.33 ab	2.20 a	2.07 ab	2.20	0.13	5.91
41	24	3.3	71	2.45 ab	2.25 a	2.15 ab	2.25 *	0.15	6.67
42	26	3.2	32	2.25 a	2.40 ab	1.96 ab	2.25 *	0.22	9.78
43	10	3.3	71	2.13 ab	2.28 a	2.31 a	2.28 *	0.10	4.39
44	19	1	10.1	2.52 a	2.45 ab	2.63 ab	2.52 *	0.09	3.57
45	30	3.3	50	3.52 a	3.41 ab	3.71 ab	3.52 *	0.15	4.26
46	11	3.3	50	3.59 ab	3.75 ab	3.64 a	3.64 *	0.08	2.20

Mean	Interlab.std. deviation	
	abs.	rel.%
1.87	**0.05**	**2.74**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **46**
Percentage of non-tolerable lab means: **17.4**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
P
% dev. from MEAN
50
40
30
20
10
0
-10
-20
-30
-40
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
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42
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44
45
45a
46
47
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49
50
51
Evaluation acc. lab. code

Element: P
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications			Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	9	5.1	31	1.17 a	1.17 a	1.16 a	1.17 *	0.01	0.85
2	46	5.6	31	1.19 a	1.20 a	1.26 ab	1.21 *	0.04	3.31
3	19	5.4	54	1.14 ab	1.22 a	1.29 ab	1.22 *	0.08	6.56
4	15	4.4	50	1.27 ab	1.21 a	1.22 a	1.23 *	0.03	2.44
5	5	6	54	1.27 a	1.32 ab	1.19 ab	1.27 *	0.07	5.51
6	28	8.3	54	1.28 ab	1.38 ab	1.32 a	1.32 *	0.05	3.79
7	8a	3.31	31	1.39	1.37	1.40	1.39	0.02	1.44
8	22	0	0	1.57 b	1.40	1.41	1.42	0.10	7.04
9	14	4.1	31	1.42	1.47 b	1.41	1.43	0.03	2.10
10	20	5.1	31	1.44	1.45	1.48	1.46	0.02	1.37
11	21	5.4	31	1.46	1.49 b	1.42 b	1.46	0.04	2.74
12	27	6.1	50	1.46	1.54 b	1.37 b	1.46	0.09	6.16
13	12	5.1	31	1.48	1.47	1.47	1.47	0.01	0.68
14	51	2	41	1.47	1.45	1.50 b	1.47	0.03	2.04
15	29	5.1	31	1.48	1.46	1.51 b	1.48	0.03	2.03
16	35	3.6	50	1.51 b	1.43 b	1.48	1.48	0.04	2.70
17	13	3.3	54	1.48	1.49	1.50	1.49	0.01	0.67
18	30	3.6	55	1.49	1.50	1.49	1.49	0.01	0.67
19	39	5.4	31	1.50	1.48	1.49	1.49	0.01	0.67
20	4	2	40	1.50	1.51	1.51	1.51	0.01	0.66
21	24	6.5	55	1.52	1.47 b	1.52	1.51	0.03	1.99
22	6	5.6	31	1.56	1.54	1.55	1.55	0.01	0.65
23	18	3.8	54	1.55	1.50 b	1.57	1.55	0.04	2.58
24	38	4.3	31	1.57	1.56	1.54	1.56	0.02	1.28
25	40	5.5	54	1.56	1.61 b	1.56	1.57	0.03	1.91
26	45	3.3	31	1.56	1.57	1.57	1.57	0.01	0.64
27	3	3.7	31	1.59	1.60	1.56	1.58	0.02	1.27
28	8	3.91	31	1.58	1.59	1.60	1.59	0.01	0.63
29	42	4.1	31	1.60	1.59	1.59	1.59	0.01	0.63
30	50	4.1	31	1.58	1.61	1.57	1.59	0.02	1.26
31	7	3.2	31	1.58	1.61	1.61	1.60	0.02	1.25
32	10	6.1	55	1.59	1.60	1.60	1.60	0.01	0.63
33	47	4.1	31	1.63	1.59 b	1.63	1.62	0.02	1.23
34	23a	6.1	31	1.61	1.64	1.63	1.63	0.02	1.23
35	41	4.1	31	1.62	1.62	1.74 b	1.63	0.07	4.29
36	4a	2	41	1.65	1.66	1.61 b	1.64	0.03	1.83
37	25	5.1	31	1.63	1.63	1.65	1.64	0.01	0.61
38	43	4.1	31	1.66	1.64	1.63	1.64	0.02	1.22
39	49	4.1	31	1.65	1.64	1.67	1.65	0.02	1.21
40	48	4.1	31	1.69 b	1.61 b	1.66	1.66	0.04	2.41
41	44	4.1	31	1.81 b	1.67	1.56 b	1.67	0.13	7.78
42	1	3.6	54	1.61 b	1.75 b	1.68	1.68	0.07	4.17
43	17	5.4	31	1.67	1.67	1.69	1.68	0.01	0.60
44	11	6.1	54	1.74	1.70	1.71	1.72	0.02	1.16
45	23	3.3	31	1.71	1.71	1.73	1.72	0.01	0.58
46	37	6.1	55	1.74	1.73	1.73	1.73	0.01	0.58
47	2	5.2	31	1.80 a	1.79 a	1.90 ab	1.81 *	0.06	3.31
48	36	6.2	55	1.83 a	1.84 a	1.85 a	1.84 *	0.01	0.54
49	31	3.5	31	2.03 ab	1.95 a	1.88 ab	1.95 *	0.08	4.10
50	26	3.2	32	2.29 a	2.28 a	2.25 a	2.27 *	0.02	0.88
								abs.	rel.%
							1.56	0.03	2.14

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	20.0

ICP-Forests 3rd needle/leaf labtest 97/98

Element: P
Dimension: mg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	9	5.1	31	0.96 a	1.01 ab	0.97 a	0.98 *	0.03	3.06
2	15	4.4	50	1.04 a	1.04 a	1.02 a	1.03 *	0.01	0.97
3	46	5.6	31	1.14 a	1.15 a	1.15 a	1.15 *	0.01	0.87
4	5	6	54	1.30 ab	1.17 a	1.15 a	1.17 *	0.08	6.84
5	8a	3.31	31	1.20 a	1.21 a	1.20 a	1.20	0.01	0.83
6	19	5.4	54	1.12 ab	1.23 ab	1.20 a	1.20	0.06	5.00
7	39	5.4	31	1.24	1.25	1.25	1.25	0.01	0.80
8	20	5.1	31	1.26	1.28	1.26	1.27	0.01	0.79
9	30	3.6	55	1.30 b	1.26	1.25	1.27	0.03	2.36
10	22	0	0	1.33 b	1.28	1.22 b	1.28	0.06	4.69
11	27	6.1	50	1.29	1.29	1.27	1.28	0.01	0.78
12	14	4.1	31	1.28	1.29	1.30	1.29	0.01	0.78
13	28	8.3	54	1.29	1.33 b	1.29	1.30	0.02	1.54
14	29	5.1	31	1.31	1.31	1.31	1.31	0.00	0.00
15	12	5.1	31	1.33	1.32	1.35	1.33	0.02	1.50
16	6	5.6	31	1.36	1.33	1.34	1.34	0.02	1.49
17	35	3.6	50	1.34	1.30 b	1.38 b	1.34	0.04	2.99
18	13	3.3	54	1.36	1.39 b	1.33 b	1.36	0.03	2.21
19	45	3.3	31	1.38	1.35	1.35	1.36	0.02	1.47
20	18	3.8	54	1.37	1.40	1.39	1.39	0.02	1.44
21	50	4.1	31	1.40	1.40	1.38	1.39	0.01	0.72
22	51	2	41	1.43 b	1.39	1.36 b	1.39	0.04	2.88
23	3	3.7	31	1.38	1.42	1.40	1.40	0.02	1.43
24	8	3.91	31	1.41	1.40	1.40	1.40	0.01	0.71
25	24	6.5	55	1.38 b	1.41	1.42	1.40	0.02	1.43
26	42	4.1	31	1.40	1.40	1.41	1.40	0.01	0.71
27	4	2	40	1.42	1.41	1.43	1.42	0.01	0.70
28	10	6.1	55	1.42	1.43	1.40	1.42	0.02	1.41
29	47	4.1	31	1.44	1.38 b	1.43	1.42	0.03	2.11
30	41	4.1	31	1.42	1.42	1.45	1.43	0.02	1.40
31	7	3.2	31	1.45	1.45	1.43	1.44	0.01	0.69
32	38	4.3	31	1.39 b	1.44	1.49 b	1.44	0.05	3.47
33	43	4.1	31	1.43	1.45	1.44	1.44	0.01	0.69
34	40	5.5	54	1.44	1.45	1.45	1.45	0.01	0.69
35	48	4.1	31	1.50 b	1.43	1.44	1.45	0.04	2.76
36	49	4.1	31	1.45	1.41 b	1.48 b	1.45	0.04	2.76
37	23a	6.1	31	1.47	1.44	1.47	1.46	0.02	1.37
38	25	5.1	31	1.46	1.48	1.50	1.48	0.02	1.35
39	44	4.1	31	1.54 b	1.36 b	1.48	1.48	0.09	6.08
40	11	6.1	54	1.50	1.50	1.48	1.49	0.01	0.67
41	21	5.4	31	1.48	1.52 b	1.48	1.49	0.02	1.34
42	4a	2	41	1.51	1.52	1.47 b	1.50	0.03	2.00
43	37	6.1	55	1.51	1.50	1.49	1.50	0.01	0.67
44	1	3.6	54	1.50	1.57 b	1.50	1.51	0.04	2.65
45	23	3.3	31	1.52	1.52	1.51	1.52	0.01	0.66
46	17	5.4	31	1.54	1.55	1.55	1.55	0.01	0.65
47	2	5.2	31	1.54 ab	1.69 ab	1.59 a	1.59	0.08	5.03
48	31	3.5	31	1.60 ab	1.64 a	1.64 a	1.63 *	0.02	1.23
49	36	6.2	55	1.68 a	1.70 a	1.69 a	1.69 *	0.01	0.59
50	26	3.2	32	2.09 ab	1.92 a	1.82 ab	1.92 *	0.14	7.29
								abs.	rel.%
							1.39	0.02	1.82

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	14.0

ICP-Forests 3rd needle/leaf labtest 97/98

Element: P
Dimension: mg/g
Sample: 3 **SPRUCE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	15	4.4	50	0.79 a	0.75 ab	0.79 a	**0.78 ***	0.02	2.56
2	46	5.6	31	0.76 ab	0.80 a	0.80 a	**0.79 ***	0.02	2.53
3	9	5.1	31	0.79 a	0.80 a	0.82 a	**0.80 ***	0.02	2.50
4	5	6	54	0.82 a	0.79 ab	0.86 ab	**0.82 ***	0.04	4.88
5	19	5.4	54	0.81 a	0.80 a	0.85 ab	**0.82 ***	0.03	3.66
6	51	2	41	0.92	0.89 b	0.94	**0.92**	0.03	3.26
7	8a	3.31	31	0.93	0.92	0.93	**0.93**	0.01	1.08
8	20	5.1	31	0.89 b	0.95	0.94	**0.93**	0.03	3.23
9	30	3.6	55	0.94	0.95	0.88 b	**0.93**	0.04	4.30
10	22	0	0	0.99 b	0.96	0.88 b	**0.96**	0.06	6.25
11	14	4.1	31	0.97	0.94 b	1.02 b	**0.97**	0.04	4.12
12	29	5.1	31	0.97	0.97	0.96	**0.97**	0.01	1.03
13	28	8.3	54	0.99	0.99	0.98	**0.99**	0.01	1.01
14	4	2	40	1.01	1.02	0.95 b	**1.00**	0.04	4.00
15	6	5.6	31	0.98	1.01	1.00	**1.00**	0.02	2.00
16	13	3.3	54	1.02	1.01	0.94 b	**1.00**	0.04	4.00
17	39	5.4	31	0.99	1.01	1.00	**1.00**	0.01	1.00
18	18	3.8	54	1.00	1.00	1.03	**1.01**	0.02	1.98
19	27	6.1	50	0.99 b	1.03	1.03	**1.02**	0.02	1.96
20	36	6.2	55	1.01	1.01	1.04	**1.02**	0.02	1.96
21	12	5.1	31	1.07 b	1.01	1.03	**1.03**	0.03	2.91
22	45	3.3	31	1.05	1.05	1.03	**1.04**	0.01	0.96
23	40	5.5	54	1.03	1.09 b	1.05	**1.05**	0.03	2.86
24	49	4.1	31	1.05	1.03	1.07	**1.05**	0.02	1.90
25	8	3.91	31	1.06	1.06	1.07	**1.06**	0.01	0.94
26	42	4.1	31	1.06	1.07	1.07	**1.07**	0.01	0.93
27	50	4.1	31	1.07	1.06	1.08	**1.07**	0.01	0.93
28	23a	6.1	31	1.07	1.08	1.08	**1.08**	0.01	0.93
29	3	3.7	31	1.06 b	1.11	1.09	**1.09**	0.03	2.75
30	7	3.2	31	1.09	1.09	1.08	**1.09**	0.01	0.92
31	25	5.1	31	1.07	1.12 b	1.09	**1.09**	0.03	2.75
32	10	6.1	55	1.09	1.10	1.10	**1.10**	0.01	0.91
33	11	6.1	54	1.13 b	1.10	1.07 b	**1.10**	0.03	2.73
34	24	6.5	55	1.05 b	1.15 b	1.10	**1.10**	0.05	4.55
35	47	4.1	31	1.11	1.10	1.10	**1.10**	0.01	0.91
36	23	3.3	31	1.10	1.16 b	1.10	**1.11**	0.03	2.70
37	41	4.1	31	1.10	1.11	1.11	**1.11**	0.01	0.90
38	43	4.1	31	1.10	1.12	1.12	**1.11**	0.01	0.90
39	44	4.1	31	1.17 b	1.11	1.07 b	**1.11**	0.05	4.50
40	38	4.3	31	1.12	1.15	1.12	**1.13**	0.02	1.77
41	48	4.1	31	1.13	1.14	1.14	**1.14**	0.01	0.88
42	17	5.4	31	1.15	1.19	1.17	**1.17**	0.02	1.71
43	4a	2	41	1.18	1.21 b	1.12 b	**1.18**	0.05	4.24
44	35	3.6	50	1.18	1.10 b	1.25 b	**1.18**	0.08	6.78
45	37	6.1	55	1.18	1.20	1.18	**1.19**	0.01	0.84
46	21	5.4	31	1.21	1.14 b	1.26 b	**1.21**	0.06	4.96
47	1	3.6	54	1.22	1.22	1.22	**1.22 ***	0.00	0.00
48	2	5.2	31	1.23 a	1.25 a	1.29 ab	**1.25 ***	0.03	2.40
49	31	3.5	31	1.27 a	1.25 a	1.27 a	**1.26 ***	0.01	0.79
50	26	3.2	32	1.41 a	1.59 ab	1.35 ab	**1.41 ***	0.12	8.51
								abs.	rel.%
							1.06	**0.02**	**2.42**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	18.0

Element: P
Dimension: mg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications			Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	15	4.4	50	0.42 ab	0.48 ab	0.46 a	0.46 *	0.03	6.52
2	9	5.1	31	0.52 a	0.52 a	0.53 ab	0.52 *	0.01	1.92
3	19	5.4	54	0.49 ab	0.56 ab	0.54 a	0.54 *	0.04	7.41
4	29	5.1	31	0.55 a	0.55 a	0.56 ab	0.55 *	0.01	1.82
5	22	0	0	0.58 b	0.53 b	0.57	0.57 *	0.03	5.26
6	13	3.3	54	0.56 b	0.58	0.58	0.58 *	0.01	1.72
7	46	5.6	31	0.56 b	0.58	0.58	0.58 *	0.01	1.72
8	4	2	40	0.60	0.60	0.59 b	0.60	0.01	1.67
9	14	4.1	31	0.60	0.62 b	0.58 b	0.60	0.02	3.33
10	8a	3.31	31	0.61 b	0.62	0.62	0.62	0.01	1.61
11	18	3.8	54	0.64 b	0.62	0.58 b	0.62	0.03	4.84
12	20	5.1	31	0.62	0.62	0.63 b	0.62	0.01	1.61
13	30	3.6	55	0.62	0.69 b	0.59 b	0.62	0.05	8.06
14	28	8.3	54	0.65	0.65	0.65	0.65	0.00	0.00
15	51	2	41	0.65	0.64 b	0.65	0.65	0.01	1.54
16	6	5.6	31	0.66	0.66	0.66	0.66	0.00	0.00
17	39	5.4	31	0.66	0.67 b	0.66	0.66	0.01	1.52
18	40	5.5	54	0.69 b	0.63 b	0.66	0.66	0.03	4.55
19	45	3.3	31	0.66	0.66	0.66	0.66	0.00	0.00
20	12	5.1	31	0.68 b	0.64 b	0.67	0.67	0.02	2.99
21	49	4.1	31	0.68	0.68	0.69 b	0.68	0.01	1.47
22	3	3.7	31	0.69	0.67 b	0.71 b	0.69	0.02	2.90
23	42	4.1	31	0.69	0.70 b	0.69	0.69	0.01	1.45
24	44	4.1	31	0.69	0.65 b	0.71 b	0.69	0.03	4.35
25	50	4.1	31	0.69	0.69	0.68 b	0.69	0.01	1.45
26	5	6	54	0.57 b	0.70	0.88 b	0.70	0.16	22.86
27	8	3.91	31	0.71 b	0.70	0.70	0.70	0.01	1.43
28	10	6.1	55	0.69 b	0.71 b	0.70	0.70	0.01	1.43
29	25	5.1	31	0.71	0.73 b	0.71	0.71	0.01	1.41
30	27	6.1	50	0.70 b	0.71	0.71	0.71	0.01	1.41
31	4a	2	41	0.72	0.78 b	0.72	0.72	0.03	4.17
32	7	3.2	31	0.71 b	0.73 b	0.72	0.72	0.01	1.39
33	24	6.5	55	0.69 b	0.74 b	0.72	0.72	0.03	4.17
34	47	4.1	31	0.76 b	0.72	0.68 b	0.72	0.04	5.56
35	38	4.3	31	0.73	0.73	0.72 b	0.73	0.01	1.37
36	43	4.1	31	0.72 b	0.73	0.73	0.73	0.01	1.37
37	23a	6.1	31	0.75 b	0.74	0.74	0.74	0.01	1.35
38	35	3.6	50	0.74	0.70 b	0.81 b	0.74	0.06	8.11
39	11	6.1	54	0.76 b	0.75	0.75	0.75	0.01	1.33
40	41	4.1	31	0.74 b	0.75	0.75	0.75	0.01	1.33
41	48	4.1	31	0.76	0.72 b	0.76	0.76	0.02	2.63
42	17	5.4	31	0.75 b	0.77	0.77	0.77	0.01	1.30
43	2	5.2	31	0.80	0.80	0.81 b	0.80 *	0.01	1.25
44	23	3.3	31	0.80	0.80	0.79 b	0.80 *	0.01	1.25
45	21	5.4	31	0.82	0.84 b	0.80 b	0.82 *	0.02	2.44
46	31	3.5	31	0.86 ab	0.80 ab	0.83 a	0.83 *	0.03	3.61
47	1	3.6	54	0.87 a	0.87 a	0.84 ab	0.87 *	0.02	2.30
48	36	6.2	55	0.87 a	0.87 a	0.89 ab	0.87 *	0.01	1.15
49	37	6.1	55	0.93 a	0.93 a	0.92 ab	0.93 *	0.01	1.08
50	26	3.2	32	1.00 a	1.21 ab	0.98 ab	1.00 *	0.13	13.00
								abs.	rel.%
							0.69	0.02	2.97

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	30.0
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	0.70

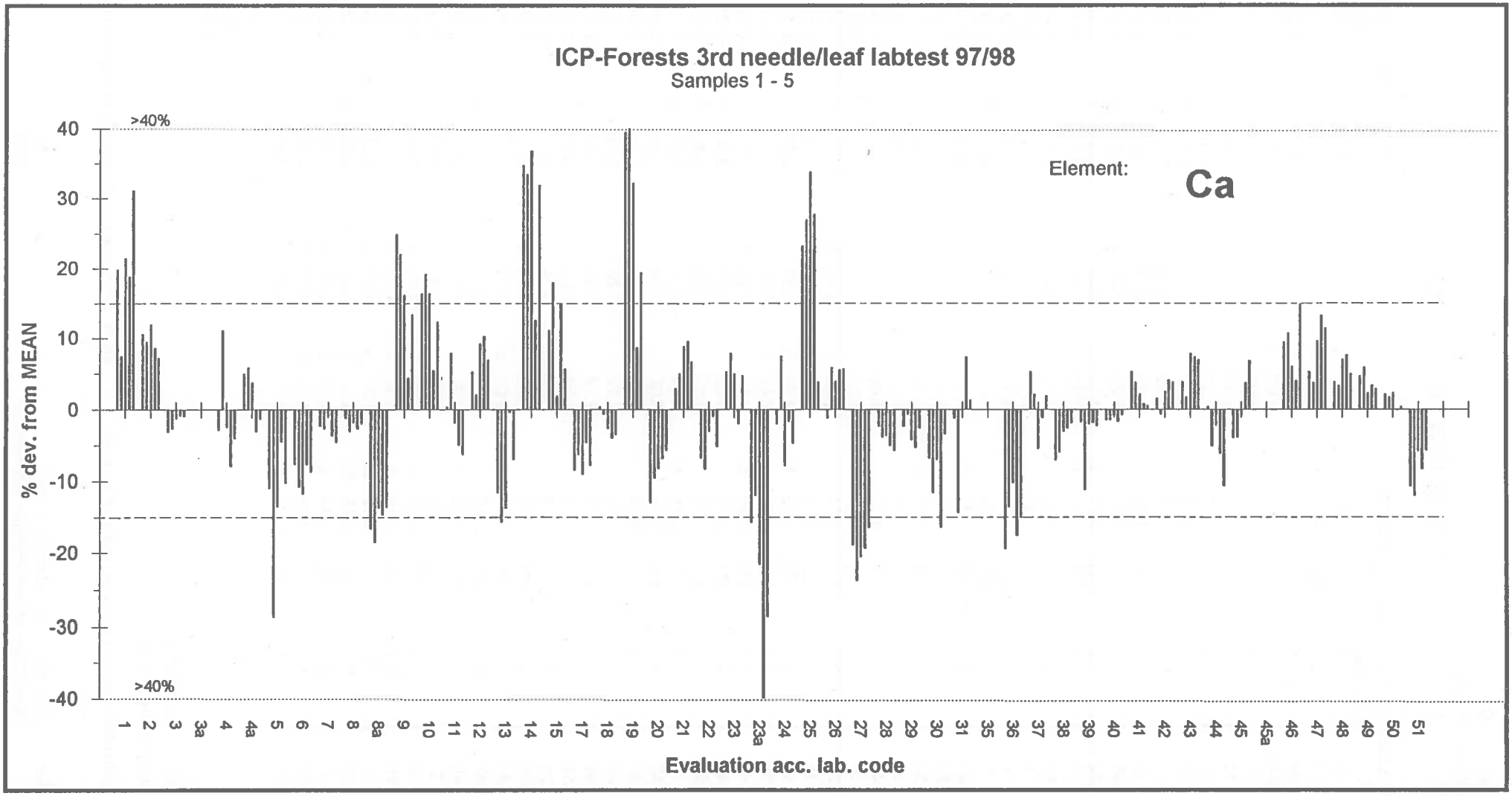
Element: P
Dimension: mg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	15	4.4	50	0.82	a	0.82	a	0.84	ab	**0.82 ***	0.01	1.22
2	9	5.1	31	0.86	a	0.87	ab	0.86	a	**0.86 ***	0.01	1.16
3	19	5.4	54	0.93	ab	0.86	ab	0.91	a	**0.91 ***	0.04	4.40
4	46	5.6	31	0.94	ab	0.95	a	1.00	ab	**0.95 ***	0.03	3.16
5	13	3.3	54	0.99	a	0.97	ab	1.02	ab	**0.99**	0.03	3.03
6	8a	3.31	31	1.04	b	1.03		1.03		**1.03**	0.01	0.97
7	14	4.1	31	1.04		1.06	b	1.00	b	**1.04**	0.03	2.88
8	22	0	0	1.04		1.08	b	0.97	b	**1.04**	0.06	5.77
9	18	3.8	54	1.10	b	1.05	b	1.06		**1.06**	0.03	2.83
10	20	5.1	31	1.06		1.08	b	1.06		**1.06**	0.01	0.94
11	51	2	41	1.08	b	1.06	b	1.07		**1.07**	0.01	0.93
12	30	3.6	55	1.08	b	1.09		1.09		**1.09**	0.01	0.92
13	44	4.1	31	1.09		1.21	b	1.07	b	**1.09**	0.08	7.34
14	4	2	40	1.11		1.11		1.10	b	**1.11**	0.01	0.90
15	6	5.6	31	1.12	b	1.11		1.11		**1.11**	0.01	0.90
16	28	8.3	54	1.10	b	1.11		1.12	b	**1.11**	0.01	0.90
17	29	5.1	31	1.11		1.11		1.12	b	**1.11**	0.01	0.90
18	39	5.4	31	1.11		1.10	b	1.11		**1.11**	0.01	0.90
19	12	5.1	31	1.11	b	1.12		1.15	b	**1.12**	0.02	1.79
20	35	3.6	50	1.12		1.03	b	1.16	b	**1.12**	0.07	6.25
21	25	5.1	31	1.13		1.14	b	1.11	b	**1.13**	0.02	1.77
22	27	6.1	50	1.13	b	1.14		1.14		**1.14**	0.01	0.88
23	45	3.3	31	1.14		1.14		1.12	b	**1.14**	0.01	0.88
24	3	3.7	31	1.16		1.11	b	1.16		**1.16**	0.03	2.59
25	5	6	54	1.16		1.16		1.25	b	**1.16**	0.05	4.31
26	7	3.2	31	1.15	b	1.16		1.17	b	**1.16**	0.01	0.86
27	49	4.1	31	1.17		1.21	b	1.17		**1.17**	0.02	1.71
28	24	6.5	55	1.17	b	1.18		1.20	b	**1.18**	0.02	1.69
29	50	4.1	31	1.18		1.18		1.15	b	**1.18**	0.02	1.69
30	8	3.91	31	1.19		1.20	b	1.18	b	**1.19**	0.01	0.84
31	40	5.5	54	1.23	b	1.19		1.15	b	**1.19**	0.04	3.36
32	42	4.1	31	1.20		1.20		1.19	b	**1.20**	0.01	0.83
33	23a	6.1	31	1.21		1.21		1.23	b	**1.21**	0.01	0.83
34	47	4.1	31	1.21		1.27	b	1.21		**1.21**	0.03	2.48
35	4a	2	41	1.22		1.26	b	1.18	b	**1.22**	0.04	3.28
36	38	4.3	31	1.23		1.25	b	1.23		**1.23**	0.01	0.81
37	41	4.1	31	1.22	b	1.24	b	1.23		**1.23**	0.01	0.81
38	11	6.1	54	1.22	b	1.24		1.24		**1.24**	0.01	0.81
39	23	3.3	31	1.24		1.16	b	1.28	b	**1.24**	0.06	4.84
40	43	4.1	31	1.23	b	1.25	b	1.24		**1.24**	0.01	0.81
41	10	6.1	55	1.30	b	1.25		1.23	b	**1.25**	0.04	3.20
42	36	6.2	55	1.26		1.36	b	1.26		**1.26**	0.06	4.76
43	48	4.1	31	1.25	b	1.26		1.26		**1.26**	0.01	0.79
44	37	6.1	55	1.28	b	1.29		1.30	b	**1.29**	0.01	0.78
45	17	5.4	31	1.30		1.30		1.31	b	**1.30**	0.01	0.77
46	21	5.4	31	1.28	b	1.30		1.30		**1.30**	0.01	0.77
47	2	5.2	31	1.34	a	1.34	a	1.33	ab	**1.34 ***	0.01	0.75
48	31	3.5	31	1.38	a	1.41	ab	1.31	ab	**1.38 ***	0.05	3.62
49	1	3.6	54	1.35	ab	1.47	a	1.47	a	**1.47 ***	0.07	4.76
50	26	3.2	32	1.60	a	1.71	ab	1.42	ab	**1.60 ***	0.15	9.38
											abs.	rel.%
										1.16	**0.02**	**2.13**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:	Data sets >0 or >detection limit:	**50**
	Percentage of non-tolerable lab means:	**16.0**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Ca
>40%
>40%
40
30
20
10
0
-10
-20
-30
-40
% dev. from MEAN
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
27
28
29
30
31
35
36
37
38
39
40
41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

Element: Ca
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	36	3.3	20	2.86	a	2.84	a	2.88	a	2.86 *	0.02	0.70
2	27	6.1	20	2.88	a	2.98	ab	2.73	ab	2.88 *	0.13	4.51
3	8a	3.31	31	2.97	a	1.99	ab	2.97	a	2.96 *	0.57	19.26
4	23a	6.1	31	2.94	a	3.02	a	2.99	a	2.99 *	0.04	1.34
5	20	5.1	31	3.09		3.05		3.11		3.09	0.03	0.97
6	13	3.3	20	3.11		3.17		3.14		3.14	0.03	0.96
7	5	3.3	20	3.12		3.17		3.17		3.16	0.03	0.95
8	51	2	41	3.19		3.12		3.18		3.17	0.04	1.26
9	17	5.4	31	3.25		3.32	b	3.22		3.25	0.05	1.54
10	6	5.6	31	3.28		3.29		3.28		3.28	0.01	0.30
11	38	4.3	31	3.33		3.30		3.24	b	3.30	0.05	1.52
12	22	0	0	3.47	b	3.16	b	3.31		3.31	0.16	4.83
13	30	3.6	20	3.47	b	3.31		3.20	b	3.31	0.14	4.23
14	45	3.3	31	3.41		3.40		3.41		3.41	0.01	0.29
15	3	3.7	31	3.44		3.42		3.47		3.44	0.03	0.87
16	4	2	40	3.45		3.47		3.44		3.45	0.02	0.58
17	7	3.2	31	3.42		3.48		3.48		3.47	0.03	0.86
18	28	8.3	20	3.40	b	3.48		3.48		3.47	0.05	1.44
19	29	5.1	31	3.45		3.46		3.50		3.47	0.03	0.86
20	24	6.5	20	3.61	b	3.48		3.39	b	3.48	0.11	3.16
21	39	5.4	31	3.49		3.50		3.48		3.49	0.01	0.29
22	40	5.5	31	3.50		3.46		3.60	b	3.50	0.07	2.00
23	8	3.91	31	3.47		3.53		3.51		3.51	0.03	0.85
24	26	3.2	31	3.51		3.25	b	3.59	b	3.51	0.18	5.13
25	31	3.5	20	3.51		3.41	b	4.41	b	3.51	0.55	15.67
26	11	6.1	70	3.43	b	3.76	b	3.57		3.57	0.17	4.76
27	18	3.8	31	3.62		3.43	b	3.57		3.57	0.10	2.80
28	44	4.1	31	3.90	b	3.57		3.39	b	3.57	0.26	7.28
29	42	4.1	31	3.61		3.62		3.61		3.61	0.01	0.28
30	50	4.1	31	3.63		3.67		3.58		3.63	0.05	1.38
31	21	5.4	31	3.18	b	3.66		3.68		3.66	0.28	7.65
32	43	4.1	31	3.74		3.67		3.69		3.69	0.04	1.08
33	48	4.1	31	3.69		3.68		3.70		3.69	0.01	0.27
34	49	4.1	31	3.72		3.70		3.74		3.72	0.02	0.54
35	4a	2	41	3.73		3.74		3.71		3.73	0.02	0.54
36	12	5.1	31	3.68	b	3.74		3.80	b	3.74	0.06	1.60
37	23	3.3	31	3.73		3.73		3.79		3.74	0.03	0.80
38	37	6.1	30	3.74		3.79		3.67	b	3.74	0.06	1.60
39	41	4.1	31	3.74		3.65	b	3.78		3.74	0.07	1.87
40	47	4.1	31	3.78		3.71		3.74		3.74	0.04	1.07
41	46	5.6	31	4.05	b	3.88		3.87		3.89	0.10	2.57
42	2	5.2	31	3.94		3.88		3.95		3.93	0.04	1.02
43	15	4.4	20	4.28	b	3.95		3.83	b	3.95	0.23	5.82
44	10	6.1	20	4.14	a	4.14	a	4.14	a	4.14 *	0.00	0.00
45	1	3.6	20	4.12	ab	4.27	a	4.27	a	4.26 *	0.09	2.11
46	25	5.1	31	4.45	ab	4.33	a	4.38	a	4.38 *	0.06	1.37
47	9	5.1	31	4.44	a	4.44	a	4.43	a	4.44 *	0.01	0.23
48	14	4.1	20	4.79	a	4.97	ab	4.52	ab	4.79 *	0.23	4.80
49	19	5.4	20	4.72	ab	5.14	ab	4.96	a	4.96 *	0.21	4.23
										Mean	Interlab.std. deviation	
											abs.	rel.%
										3.55	0.09	2.65

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	20.4

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Ca
Dimension: mg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	5	3.3	20	1.74	a	1.81	ab	1.74	a	1.75 *	0.04	2.29
2	27	6.1	20	1.88	a	1.50	ab	1.88	a	1.87 *	0.22	11.76
3	8a	3.31	31	1.99	a	2.01	a	2.01	a	2.00 *	0.01	0.50
4	13	3.3	20	2.04		2.12	b	2.07		2.07 *	0.04	1.93
5	31	3.5	20	2.06		2.18	b	2.10		2.10	0.06	2.86
6	36	3.3	20	2.10		2.12		2.23	b	2.12	0.07	3.30
7	23a	6.1	31	2.15		2.16		2.18		2.16	0.02	0.93
8	51	2	41	2.16		2.17		2.15		2.16	0.01	0.46
9	30	3.6	20	2.06	b	2.17		2.24	b	2.17	0.09	4.15
10	39	5.4	31	2.17		2.20		2.18		2.18	0.02	0.92
11	6	5.6	31	2.20		2.19		2.19		2.19	0.01	0.46
12	20	5.1	31	2.22		2.25		2.20		2.22	0.03	1.35
13	22	0	0	2.25		2.11	b	2.31	b	2.25	0.10	4.44
14	17	5.4	31	2.35	b	2.15	b	2.30		2.30	0.10	4.35
15	38	4.3	31	2.28		2.31		2.39	b	2.31	0.06	2.60
16	44	4.1	31	2.46	b	2.16	b	2.33		2.33	0.15	6.44
17	28	8.3	20	2.36		2.33		2.40		2.36	0.04	1.69
18	45	3.3	31	2.39		2.34		2.36		2.36	0.03	1.27
19	8	3.91	31	2.39		2.35		2.39		2.38	0.02	0.84
20	3	3.7	31	2.37		2.39		2.41		2.39	0.02	0.84
21	7	3.2	31	2.39		2.43		2.35		2.39	0.04	1.67
22	40	5.5	31	2.42		2.26	b	2.45		2.42	0.10	4.13
23	18	3.8	31	2.41		2.51	b	2.44		2.44	0.05	2.05
24	29	5.1	31	2.50	b	2.44		2.41		2.44	0.05	2.05
25	42	4.1	31	2.44		2.43		2.44		2.44	0.01	0.41
26	43	4.1	31	2.48		2.53		2.49		2.50	0.03	1.20
27	50	4.1	31	2.51		2.51		2.49		2.50	0.01	0.40
28	12	5.1	31	2.51		2.48		2.57	b	2.51	0.05	1.99
29	37	6.1	30	2.51		2.55		2.48		2.51	0.04	1.59
30	48	4.1	31	2.56		2.55		2.51		2.54	0.03	1.18
31	41	4.1	31	2.54		2.55		2.56		2.55	0.01	0.39
32	47	4.1	31	2.57		2.54		2.55		2.55	0.02	0.78
33	21	5.4	31	2.62		2.58		2.54		2.58	0.04	1.55
34	4a	2	41	2.61		2.62		2.58		2.60	0.02	0.77
35	26	3.2	31	2.63		2.53	b	2.60		2.60	0.05	1.92
36	49	4.1	31	2.60		2.61		2.59		2.60	0.01	0.38
37	1	3.6	20	2.79	b	2.64		2.49	b	2.64	0.15	5.68
38	24	6.5	20	2.67		2.41	b	2.64		2.64	0.14	5.30
39	11	6.1	70	2.67		2.65		2.59	b	2.65	0.04	1.51
40	23	3.3	31	2.65		2.62		2.67		2.65	0.03	1.13
41	2	5.2	31	2.64	b	2.73		2.69		2.69	0.05	1.86
42	46	5.6	31	2.73		2.72		2.72		2.72	0.01	0.37
43	4	2	40	2.75		2.72		2.73		2.73	0.02	0.73
44	15	4.4	20	2.70	b	2.90		2.93		2.90 *	0.13	4.48
45	10	6.1	20	2.94	a	2.91	a	2.93	a	2.93 *	0.02	0.68
46	9	5.1	31	3.01	a	3.02	a	2.96	ab	3.00 *	0.03	1.00
47	25	5.1	31	3.10	a	3.14	a	3.12	a	3.12 *	0.02	0.64
48	14	4.1	20	3.28	a	3.36	ab	3.13	ab	3.28 *	0.12	3.66
49	19	5.4	20	3.35	ab	3.53	a	3.90	ab	3.53 *	0.28	7.93
										Mean	Interlab.std. deviation	
											abs.	rel.%
										2.46	0.06	2.26

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	20.4

Element: Ca
Dimension: mg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications						Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	23a	6.1	31	3.88	a	3.89	a	3.86	a	3.88 *	0.02	0.52
2	27	6.1	20	3.85	a	4.08	ab	3.93	a	3.93 *	0.12	3.05
3	8a	3.31	31	4.23		4.26		4.32		4.27	0.05	1.17
4	13	3.3	20	4.30		4.30		4.10	b	4.27	0.12	2.81
5	5	3.3	20	4.26		4.26		4.31		4.28	0.03	0.70
6	6	5.6	31	4.32		4.42		4.38		4.37	0.05	1.14
7	36	3.3	20	4.44		4.26	b	4.50		4.44	0.12	2.70
8	17	5.4	31	4.45		4.48		4.60	b	4.50	0.08	1.78
9	20	5.1	31	4.43	b	4.54		4.69	b	4.54	0.13	2.86
10	24	6.5	20	4.97	b	4.47		4.56		4.56	0.27	5.92
11	30	3.6	20	4.60		4.76	b	4.51		4.60	0.13	2.83
12	51	2	41	4.72		4.57		4.67		4.66	0.08	1.72
13	37	6.1	30	4.68		4.72		4.65		4.68	0.04	0.85
14	29	5.1	31	4.69		4.74		4.80		4.74	0.06	1.27
15	28	8.3	20	4.77		4.83		4.72		4.77	0.06	1.26
16	22	0	0	4.80		4.63	b	4.88		4.80	0.13	2.71
17	38	4.3	31	4.78		4.84		4.77		4.80	0.04	0.83
18	18	3.8	31	4.68	b	4.82		4.97	b	4.82	0.15	3.11
19	4	2	40	4.87		4.86		4.77		4.83	0.06	1.24
20	44	4.1	31	5.17	b	4.79		4.83		4.84	0.21	4.34
21	39	5.4	31	4.87		4.84		4.85		4.85	0.02	0.41
22	8	3.91	31	4.85		4.87		4.87		4.86	0.01	0.21
23	11	6.1	70	4.97	b	4.85		4.81		4.86	0.08	1.65
24	3	3.7	31	4.85		5.13	b	4.86		4.89	0.16	3.27
25	7	3.2	31	4.89		4.92		4.89		4.90	0.02	0.41
26	40	5.5	31	4.91		4.99		4.75	b	4.91	0.12	2.44
27	45	3.3	31	4.92		4.92		4.90		4.91	0.01	0.20
28	31	3.5	20	6.54	b	4.93		4.90		4.95	0.94	18.99
29	15	4.4	20	5.07		4.97		5.10		5.05	0.07	1.39
30	41	4.1	31	5.05		5.00		5.25	b	5.06	0.13	2.57
31	49	4.1	31	5.07		4.92	b	5.21	b	5.07	0.15	2.96
32	50	4.1	31	5.10		5.10		4.99		5.07	0.06	1.18
33	42	4.1	31	5.09		5.07		5.09		5.08	0.01	0.20
34	4a	2	41	5.15		5.14		5.13		5.14	0.01	0.19
35	26	3.2	31	5.12		5.12		5.32	b	5.15	0.12	2.33
36	23	3.3	31	5.13		5.20		5.32	b	5.20	0.10	1.92
37	46	5.6	31	5.27		5.13	b	5.29		5.25	0.09	1.71
38	48	4.1	31	5.30		5.35		5.26		5.30	0.05	0.94
39	43	4.1	31	5.38		5.30		5.33		5.34	0.04	0.75
40	21	5.4	31	5.44		5.38		5.34		5.39	0.05	0.93
41	12	5.1	31	5.36		5.39		5.48		5.41	0.06	1.11
42	47	4.1	31	5.46		5.34		5.46		5.43	0.07	1.29
43	2	5.2	31	5.35	b	5.55		5.72	b	5.55	0.19	3.42
44	9	5.1	31	5.73	a	5.93	ab	5.73	a	5.76 *	0.12	2.08
45	10	6.1	20	5.84	a	5.77	a	5.68	a	5.77 *	0.08	1.39
46	1	3.6	20	5.99	a	6.14	ab	5:99	a	6.02 *	0.09	1.50
47	19	5.4	20	6.23	ab	6.55	a	6.71	ab	6.55 *	0.24	3.66
48	25	5.1	31	6.68	a	6.59	a	6.63	a	6.63 *	0.05	0.75
49	14	4.1	20	6.78	a	6.91	ab	6.42	ab	6.78 *	0.25	3.69
										Mean	Interlab.std. deviation abs.	Interlab.std. deviation rel.%
										4.95	0.11	2.17

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **49**
Percentage of non-tolerable lab means: **16.3**

Element: Ca
Dimension: mg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	7.61	a	7.82	a	7.84	a	7.77 *	0.13	1.67
2	27	6.1	20	10.35	a	10.53	a	10.40	a	10.43 *	0.09	0.86
3	36	3.3	20	10.79	a	10.66	a	10.27	ab	10.66 *	0.27	2.53
4	30	3.6	20	10.58	ab	10.81	a	11.33	ab	10.81 *	0.38	3.52
5	8a	3.31	31	11.00	a	11.00	a	11.10	a	11.03	0.06	0.54
6	51	2	41	11.79		11.91		11.87		11.86	0.06	0.51
7	4	2	40	11.83		11.87		12.05		11.91	0.12	1.01
8	6	5.6	31	12.00		11.90		11.90		11.93	0.06	0.50
9	20	5.1	31	12.01		12.06		12.09		12.05	0.04	0.33
10	44	4.1	31	12.14		11.53	b	12.70	b	12.14	0.59	4.86
11	29	5.1	31	12.28		12.28		12.18		12.25	0.06	0.49
12	28	8.3	20	12.36		12.19		12.28		12.28	0.09	0.73
13	11	6.1	70	12.29		11.74	b	12.99	b	12.29	0.63	5.13
14	17	5.4	31	12.13	b	12.35		12.42		12.33	0.15	1.22
15	5	3.3	20	12.37		12.32		12.37		12.35	0.03	0.24
16	18	3.8	31	12.42		12.61	b	11.86	b	12.42	0.39	3.14
17	7	3.2	31	12.32		12.54		12.49		12.46	0.12	0.96
18	4a	2	41	12.55		12.54		12.54		12.54	0.01	0.08
19	8	3.91	31	12.54		12.52		12.89	b	12.59	0.21	1.67
20	38	4.3	31	12.70		12.60		12.50		12.60	0.10	0.79
21	23	3.3	31	12.58		12.88	b	12.66		12.68	0.16	1.26
22	39	5.4	31	12.68		12.60		12.84		12.70	0.12	0.94
23	24	6.5	20	12.72		12.35	b	12.88		12.72	0.27	2.12
24	40	5.5	31	12.90	b	12.69		12.64		12.72	0.14	1.10
25	37	6.1	30	12.80		12.72		12.85		12.79	0.07	0.55
26	22	0	0	12.58	b	12.81		13.40	b	12.81	0.42	3.28
27	3	3.7	31	12.83		12.54	b	13.01	b	12.83	0.24	1.87
28	13	3.3	20	12.70	b	13.00		12.90		12.89	0.15	1.16
29	50	4.1	31	13.03		12.94		12.74	b	12.93	0.15	1.16
30	41	4.1	31	13.11		12.99		13.03		13.04	0.06	0.46
31	49	4.1	31	13.37		13.42		13.31		13.37	0.06	0.45
32	45	3.3	31	13.48		13.31		13.48		13.42	0.10	0.75
33	46	5.6	31	13.41		13.76	b	13.40		13.46	0.21	1.56
34	42	4.1	31	13.47		13.52		13.42		13.47	0.05	0.37
35	9	5.1	31	13.40		13.90	b	13.50		13.51	0.26	1.92
36	10	6.1	20	13.56		13.61		14.88	b	13.64	0.75	5.50
37	26	3.2	31	13.63		14.00	b	13.55		13.65	0.24	1.76
38	31	3.5	20	13.88		14.16	b	13.23	b	13.88	0.48	3.46
39	43	4.1	31	13.81		13.83		14.08	b	13.88	0.15	1.08
40	48	4.1	31	13.98		13.76		13.97		13.92	0.12	0.86
41	2	5.2	31	13.88		14.05		14.34	b	14.05	0.23	1.64
42	19	5.4	20	14.11		14.13		13.80	b	14.06	0.19	1.35
43	21	5.4	31	14.22		14.20		14.08		14.17	0.08	0.56
44	12	5.1	31	14.04	b	14.32		14.32		14.26	0.16	1.12
45	14	4.1	20	14.58		14.80	b	14.22	b	14.58	0.29	1.99
46	47	4.1	31	14.64	a	14.69	a	14.62	a	14.65	0.04	0.27
47	15	4.4	20	14.88	a	14.76	a	15.02	a	14.88	0.13	0.87
48	1	3.6	20	15.38	a	15.24	a	15.54	a	15.38 *	0.15	0.98
49	25	5.1	31	16.43	a	16.52	a	16.61	a	16.52 *	0.09	0.54
										Mean	Interlab.std. deviation	
											abs.	rel.%
										12.94	0.19	1.46

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**49**
	Percentage of non-tolerable lab means:	**12.2**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**12.55**

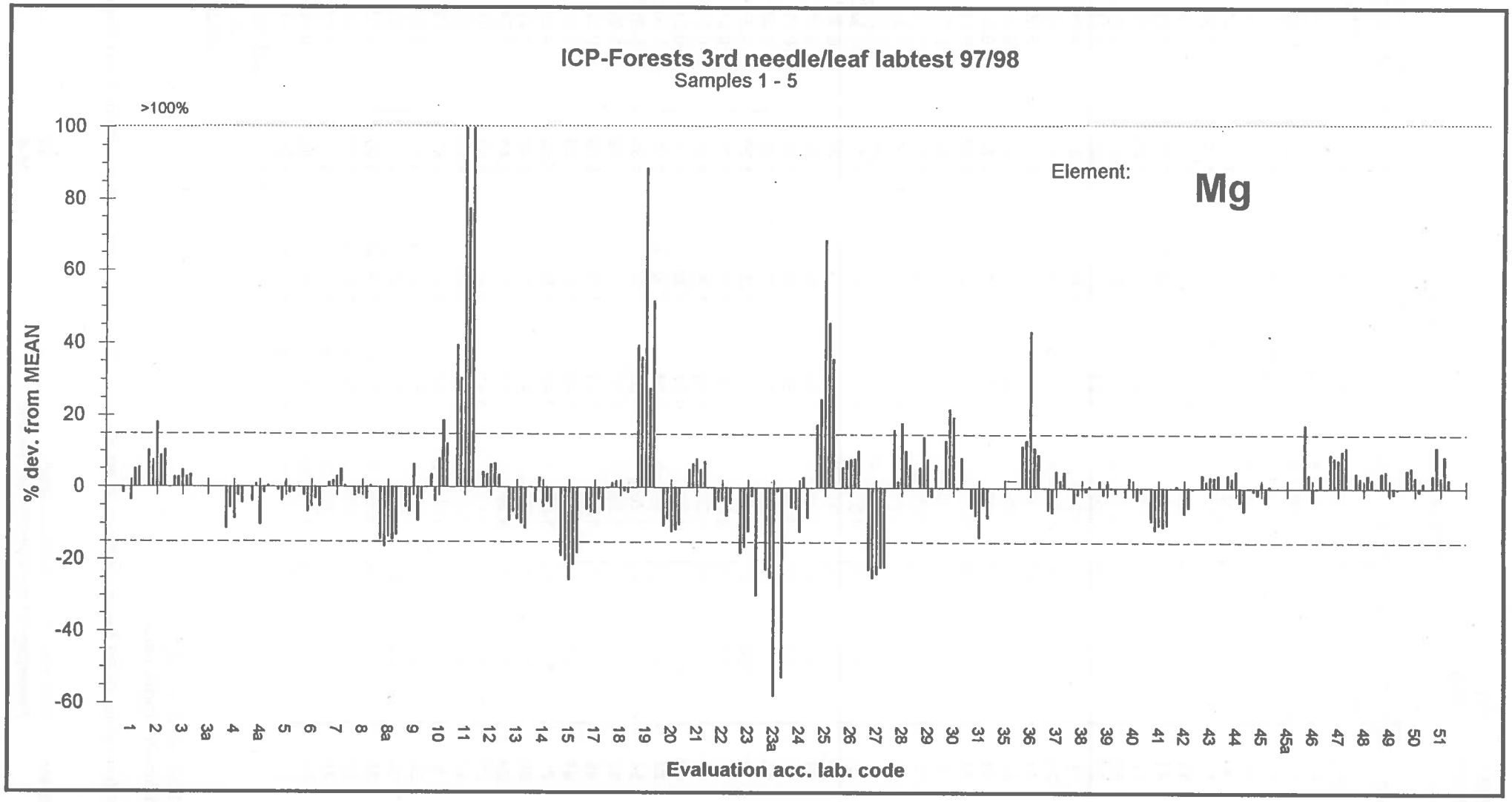
Element: Ca
Dimension: mg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	23a	6.1	31	5.23 a	5.10 a	5.18 a	5.17 *	0.07	1.35
2	27	6.1	20	6.13 a	6.05 a	5.80 ab	6.05 *	0.17	2.81
3	36	3.3	20	6.39 ab	6.10 a	6.14 a	6.15 *	0.16	2.60
4	8a	3.31	31	6.29 a	6.26 a	6.24 a	6.26	0.03	0.48
5	44	4.1	31	6.47	7.26 b	6.31 b	6.47	0.51	7.88
6	5	3.3	20	6.65 b	6.40	6.50	6.50	0.13	2.00
7	6	5.6	31	6.63	6.59	6.61	6.61	0.02	0.30
8	17	5.4	31	6.81 b	6.65	6.64	6.68	0.10	1.50
9	13	3.3	20	6.76	6.77	6.68	6.74	0.05	0.74
10	11	6.1	70	6.79	6.98 b	6.61 b	6.79	0.19	2.80
11	20	5.1	31	6.83	6.85	6.82	6.83	0.02	0.29
12	28	8.3	20	6.87	6.85	6.72	6.83	0.08	1.17
13	51	2	41	6.79	6.89	6.80	6.83	0.06	0.88
14	22	0	0	7.01 b	6.87	6.81	6.87	0.10	1.46
15	24	6.5	20	7.35 b	6.89	6.85	6.90	0.28	4.06
16	7	3.2	31	6.79 b	6.92	6.97	6.91	0.09	1.30
17	4	2	40	6.95	6.99	6.92	6.95	0.04	0.58
18	18	3.8	31	7.25 b	6.81 b	6.99	6.99	0.22	3.15
19	30	3.6	20	7.06	6.95	6.99	7.00	0.06	0.86
20	29	5.1	31	7.00	7.06	7.35 b	7.06	0.19	2.69
21	39	5.4	31	7.13	7.09	6.90 b	7.08	0.12	1.69
22	8	3.91	31	7.06	7.08	7.16	7.10	0.05	0.70
23	38	4.3	31	7.08	7.13	7.11	7.11	0.03	0.42
24	4a	2	41	7.19	7.17	7.08	7.15	0.06	0.84
25	3	3.7	31	7.20	6.98 b	7.22	7.18	0.13	1.81
26	40	5.5	31	7.25	7.19	7.10	7.19	0.08	1.11
27	50	4.1	31	7.32	7.31	7.20	7.28	0.07	0.96
28	41	4.1	31	7.24	7.37	7.27	7.29	0.07	0.96
29	31	3.5	20	7.40	7.19 b	7.36	7.35	0.11	1.50
30	37	6.1	30	7.38	7.33	7.45	7.39	0.06	0.81
31	49	4.1	31	7.46	7.53	7.35 b	7.46	0.09	1.21
32	25	5.1	31	7.45	7.53	7.87 b	7.53	0.22	2.92
33	42	4.1	31	7.51	7.55	7.53	7.53	0.02	0.27
34	23	3.3	31	7.68	6.96 b	7.59	7.59	0.39	5.14
35	48	4.1	31	7.56	7.70	7.60	7.61	0.07	0.92
36	15	4.4	20	7.66	8.41 b	7.35 b	7.66	0.55	7.18
37	26	3.2	31	7.63	7.79 b	7.63	7.66	0.09	1.17
38	21	5.4	31	7.72	7.68	7.80	7.73	0.06	0.78
39	45	3.3	31	7.72	7.80	7.70	7.74	0.05	0.65
40	12	5.1	31	7.71	7.79	7.74	7.75	0.04	0.52
41	43	4.1	31	7.75	7.82	7.68	7.75	0.07	0.90
42	2	5.2	31	7.72	7.81	7.78	7.77	0.05	0.64
43	47	4.1	31	8.02	8.17	8.07	8.08	0.08	0.99
44	10	6.1	20	8.28 b	8.02 b	8.15	8.15	0.13	1.60
45	9	5.1	31	8.24 a	8.21 a	8.20 a	8.22	0.02	0.24
46	46	5.6	31	8.18 ab	8.33 a	8.50 ab	8.33	0.16	1.92
47	19	5.4	20	8.26 ab	9.04 ab	8.66 a	8.66 *	0.39	4.50
48	1	3.6	20	9.26 ab	9.54 a	9.54 a	9.51 *	0.16	1.68
49	14	4.1	20	9.56 a	9.76 ab	9.24 ab	9.56 *	0.26	2.72
							Mean	Interlab.std. deviation	
								abs.	rel.%
							7.25	0.13	1.75

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	12.2


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>100%
Element:
Mg
% dev. from MEAN
100
80
60
40
20
0
-20
-40
-60
1
2
3
3a
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4a
5
6
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45a
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49
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51
Evaluation acc. lab. code

Element: Mg
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	23a	6.1	31	1.02 a	1.05 a	1.03 a	1.03 *	0.02	1.94
2	27	6.1	20	1.03 a	1.08 ab	1.00 ab	1.03 *	0.04	3.88
3	15	4.4	20	1.08 a	1.10 a	1.05 ab	1.08 *	0.03	2.78
4	23	3.3	31	1.11 a	1.05 ab	1.09 a	1.09 *	0.03	2.75
5	8a	3.31	31	1.14 a	1.14 a	1.14 a	1.14	0.00	0.00
6	4	2	40	1.13 b	1.19	1.20	1.18	0.04	3.39
7	20	5.1	31	1.19	1.22 b	1.16 b	1.19	0.03	2.52
8	13	3.3	20	1.20	1.23	1.20	1.21	0.02	1.65
9	41	4.1	31	1.20	1.19	1.28 b	1.21	0.05	4.13
10	17	5.4	31	1.25	1.25	1.25	1.25	0.00	0.00
11	22	0	0	1.31 b	1.22 b	1.25	1.25	0.05	4.00
12	37	6.1	30	1.25	1.24	1.25	1.25	0.01	0.80
13	9	5.1	31	1.26	1.27	1.25	1.26	0.01	0.79
14	24	6.5	20	1.37 b	1.18 b	1.26	1.26	0.10	7.94
15	31	3.5	20	1.26	1.24	1.34 b	1.26	0.05	3.97
16	4a	2	41	1.28	1.30	1.27	1.28	0.02	1.56
17	14	4.1	20	1.28	1.26	1.30	1.28	0.02	1.56
18	38	4.3	31	1.29	1.29	1.27	1.28	0.01	0.78
19	6	5.6	31	1.30	1.30	1.30	1.30	0.00	0.00
20	8	3.91	31	1.30	1.30	1.30	1.30	0.00	0.00
21	40	5.5	31	1.34 b	1.29	1.29	1.30	0.03	2.31
22	1	3.6	20	1.28 b	1.31	1.38 b	1.31	0.05	3.82
23	5	3.3	20	1.31	1.31	1.36 b	1.32	0.03	2.27
24	45	3.3	31	1.31	1.32	1.32	1.32	0.01	0.76
25	42	4.1	31	1.34	1.34	1.33	1.34	0.01	0.75
26	7	3.2	31	1.34	1.36	1.36	1.35	0.01	0.74
27	18	3.8	31	1.36	1.31 b	1.36	1.35	0.03	2.22
28	39	5.4	31	1.37	1.34	1.36	1.36	0.02	1.47
29	3	3.7	31	1.37	1.36	1.37	1.37	0.01	0.73
30	10	6.1	20	1.36	1.39	1.38	1.38	0.02	1.45
31	43	4.1	31	1.39	1.37	1.38	1.38	0.01	0.72
32	44	4.1	31	1.52 b	1.38	1.32 b	1.38	0.10	7.25
33	51	2	41	1.39	1.38	1.38	1.38	0.01	0.72
34	12	5.1	31	1.36 b	1.39	1.45 b	1.39	0.05	3.60
35	48	4.1	31	1.38	1.41	1.39	1.39	0.02	1.44
36	49	4.1	31	1.39	1.40	1.37	1.39	0.02	1.44
37	21	5.4	31	1.36 b	1.42	1.40	1.40	0.03	2.14
38	50	4.1	31	1.39	1.41	1.39	1.40	0.01	0.71
39	26	3.2	31	1.36 b	1.43	1.41	1.41	0.04	2.84
40	29	5.1	31	1.40	1.41	1.42	1.41	0.01	0.71
41	47	4.1	31	1.47	1.44	1.46	1.46	0.02	1.37
42	2	5.2	31	1.50 b	1.47	1.45	1.47	0.03	2.04
43	36	3.3	20	1.49	1.51	1.45 b	1.49	0.03	2.01
44	30	3.6	20	1.49	1.55 b	1.50	1.51	0.03	1.99
45	28	8.3	20	1.55 a	1.50 ab	1.64 ab	1.55 *	0.07	4.52
46	25	5.1	31	1.58 a	1.59 a	1.55 a	1.57 *	0.02	1.27
47	46	5.6	31	1.82 ab	1.57 a	1.54 ab	1.57 *	0.15	9.55
48	11	6.1	70	1.79 ab	2.07 ab	1.86 a	1.86 *	0.15	8.06
49	19	5.4	20	1.70 ab	1.86 a	1.90 ab	1.86 *	0.11	5.91
							Mean	Interlab.std. deviation	
								abs.	rel.%
							1.33	0.03	2.43

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	18.4

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Mg
Dimension: mg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	0.79	ab	0.78	a	0.69	ab	0.78 *	0.06	7.69
2	27	6.1	20	0.78	a	0.63	ab	0.78	a	0.78 *	0.09	11.54
3	15	4.4	20	0.85	ab	0.83	a	0.83	a	0.83 *	0.01	1.20
4	8a	3.31	31	0.87	a	0.88	ab	0.87	a	0.87 *	0.01	1.15
5	23	3.3	31	0.87	a	0.87	a	0.86	ab	0.87 *	0.01	1.15
6	41	4.1	31	0.92		0.92		0.93	b	0.92	0.01	1.09
7	20	5.1	31	0.95		0.94	b	0.96	b	0.95	0.01	1.05
8	31	3.5	20	0.96		0.95	b	0.96		0.96	0.01	1.04
9	6	5.6	31	0.98	b	0.97		0.97		0.97	0.01	1.03
10	9	5.1	31	0.97		0.95	b	0.97		0.97	0.01	1.03
11	13	3.3	20	0.99	b	0.97		0.96	b	0.97	0.02	2.06
12	17	5.4	31	1.01	b	0.96	b	0.97		0.97	0.03	3.09
13	37	6.1	30	0.95	b	0.97		0.97		0.97	0.01	1.03
14	4	2	40	1.00	b	0.98		0.97	b	0.98	0.02	2.04
15	24	6.5	20	1.08	b	0.94	b	0.98		0.98	0.07	7.14
16	5	3.3	20	1.00		1.00		1.00		1.00	0.00	0.00
17	10	6.1	20	1.01	b	1.00		1.00		1.00	0.01	1.00
18	22	0	0	1.01	b	1.00		0.97	b	1.00	0.02	2.00
19	8	3.91	31	1.03	b	1.02		1.02		1.02	0.01	0.98
20	38	4.3	31	1.01	b	1.02		1.05	b	1.02	0.02	1.96
21	39	5.4	31	1.02		1.04	b	1.02		1.02	0.01	0.98
22	45	3.3	31	1.04	b	1.02		1.02		1.02	0.01	0.98
23	1	3.6	20	1.04		1.05	b	1.01	b	1.04	0.02	1.92
24	42	4.1	31	1.04		1.05	b	1.04		1.04	0.01	0.96
25	4a	2	41	1.05		1.08	b	1.05		1.05	0.02	1.90
26	7	3.2	31	1.06		1.07	b	1.05	b	1.06	0.01	0.94
27	18	3.8	31	1.05	b	1.07	b	1.06		1.06	0.01	0.94
28	28	8.3	20	1.06		1.05	b	1.07	b	1.06	0.01	0.94
29	43	4.1	31	1.05	b	1.07	b	1.06		1.06	0.01	0.94
30	3	3.7	31	1.07		1.07		1.07		1.07	0.00	0.00
31	14	4.1	20	1.07		1.03	b	1.09	b	1.07	0.03	2.80
32	40	5.5	31	1.01	b	1.07		1.09	b	1.07	0.04	3.74
33	44	4.1	31	1.12	b	0.98	b	1.07		1.07	0.07	6.54
34	48	4.1	31	1.09	b	1.07		1.05	b	1.07	0.02	1.87
35	12	5.1	31	1.08		1.04	b	1.09	b	1.08	0.03	2.78
36	46	5.6	31	1.07	b	1.08		1.08		1.08	0.01	0.93
37	49	4.1	31	1.09		1.09		1.09		1.09	0.00	0.00
38	50	4.1	31	1.10		1.10		1.10		1.10	0.00	0.00
39	21	5.4	31	1.12	b	1.08	b	1.11		1.11	0.02	1.80
40	2	5.2	31	1.12		1.11	b	1.14	b	1.12	0.02	1.79
41	26	3.2	31	1.14	b	1.08	b	1.12		1.12	0.03	2.68
42	47	4.1	31	1.15	b	1.13		1.13		1.13	0.01	0.88
43	51	2	41	1.16		1.17	b	1.14	b	1.16	0.02	1.72
44	36	3.3	20	1.20	b	1.18		1.13	b	1.18	0.04	3.39
45	29	5.1	31	1.19		1.18	b	1.19		1.19	0.01	0.84
46	30	3.6	20	1.27	a	1.28	ab	1.27	a	1.27 *	0.01	0.79
47	25	5.1	31	1.30	a	1.32	ab	1.29	ab	1.30 *	0.02	1.54
48	11	6.1	70	1.36	a	1.36	a	1.32	ab	1.36 *	0.02	1.47
49	19	5.4	20	1.36	ab	1.42	a	1.73	ab	1.42 *	0.20	14.08
										Mean	Interlab.std. deviation	
											abs.	rel.%
										1.04	0.02	2.23

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	18.4

Element: Mg
Dimension: mg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes pretreatm.	determ.	Replications			Lab.mean	Lab.standard deviation abs.	rel.%
1	23a	6.1	31	0.21 ab	0.31 ab	0.25 a	0.25 *	0.05	20.00
2	15	4.4	20	0.46 ab	0.44 a	0.44 a	0.44 *	0.01	2.27
3	27	6.1	20	0.40 ab	0.45 a	0.45 a	0.45 *	0.03	6.67
4	8a	3.31	31	0.51	0.51	0.51	0.51	0.00	0.00
5	31	3.5	20	0.66 b	0.51	0.50 b	0.51	0.09	17.65
6	20	5.1	31	0.51 b	0.52	0.52	0.52	0.01	1.92
7	23	3.3	31	0.46 b	0.52	0.59 b	0.52	0.07	13.46
8	24	6.5	20	0.57 b	0.49 b	0.52	0.52	0.04	7.69
9	4a	2	41	0.53	0.54 b	0.53	0.53	0.01	1.89
10	41	4.1	31	0.53	0.53	0.53	0.53	0.00	0.00
11	4	2	40	0.54	0.56 b	0.52 b	0.54	0.02	3.70
12	13	3.3	20	0.54	0.55 b	0.53 b	0.54	0.01	1.85
13	17	5.4	31	0.55	0.55	0.55	0.55	0.00	0.00
14	42	4.1	31	0.55	0.55	0.56 b	0.55	0.01	1.82
15	6	5.6	31	0.56	0.56	0.56	0.56	0.00	0.00
16	14	4.1	20	0.56	0.53 b	0.61 b	0.56	0.04	7.14
17	1	3.6	20	0.57	0.55 b	0.57	0.57	0.01	1.75
18	22	0	0	0.58 b	0.57	0.57	0.57	0.01	1.75
19	46	5.6	31	0.57	0.57	0.59 b	0.57	0.01	1.75
20	49	4.1	31	0.58	0.57 b	0.59 b	0.58	0.01	1.72
21	8	3.91	31	0.58 b	0.59	0.60 b	0.59	0.01	1.69
22	18	3.8	31	0.59	0.59	0.61 b	0.59	0.01	1.69
23	38	4.3	31	0.59	0.59	0.59	0.59	0.00	0.00
24	40	5.5	31	0.60 b	0.59	0.58 b	0.59	0.01	1.69
25	48	4.1	31	0.59	0.61 b	0.59	0.59	0.01	1.69
26	5	3.3	20	0.60	0.60	0.60	0.60	0.00	0.00
27	39	5.4	31	0.60	0.60	0.60	0.60	0.00	0.00
28	45	3.3	31	0.60	0.60	0.60	0.60	0.00	0.00
29	7	3.2	31	0.61	0.61	0.61	0.61	0.00	0.00
30	43	4.1	31	0.61	0.61	0.61	0.61	0.00	0.00
31	50	4.1	31	0.61	0.60 b	0.61	0.61	0.01	1.64
32	51	2	41	0.61	0.60 b	0.62 b	0.61	0.01	1.64
33	3	3.7	31	0.62	0.64 b	0.61 b	0.62	0.02	3.23
34	37	6.1	30	0.63 b	0.61 b	0.62	0.62	0.01	1.61
35	44	4.1	31	0.67 b	0.62	0.62	0.62	0.03	4.84
36	9	5.1	31	0.63	0.63	0.64 b	0.63	0.01	1.59
37	12	5.1	31	0.63	0.64 b	0.62 b	0.63	0.01	1.59
38	10	6.1	20	0.63 b	0.64	0.66 b	0.64	0.02	3.13
39	21	5.4	31	0.64	0.66 b	0.62 b	0.64	0.02	3.13
40	26	3.2	31	0.62 b	0.66 b	0.64	0.64	0.02	3.13
41	29	5.1	31	0.62 b	0.64	0.67 b	0.64	0.03	4.69
42	47	4.1	31	0.65 b	0.64	0.63 b	0.64	0.01	1.56
43	2	5.2	31	0.60 ab	0.71 ab	0.70 a	0.70 *	0.06	8.57
44	28	8.3	20	0.70 a	0.74 ab	0.61 ab	0.70 *	0.07	10.00
45	30	3.6	20	0.72 ab	0.71 a	0.71 a	0.71 *	0.01	1.41
46	36	3.3	20	0.85 a	0.83 ab	0.88 ab	0.85 *	0.03	3.53
47	25	5.1	31	1.00 a	1.08 ab	0.99 ab	1.00 *	0.05	5.00
48	19	5.4	20	1.01 ab	1.12 a	1.16 ab	1.12 *	0.08	7.14
49	11	6.1	70	1.26 ab	1.31 a	1.35 ab	1.31 *	0.05	3.82
							Mean	Interlab.std. deviation abs.	rel.%
							0.59	0.02	3.49

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: 49
Percentage of non-tolerable lab means: 20.4

Element: Mg
Dimension: mg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications			Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	27	6.1	20	1.03 a	1.03 a	1.03 a	1.03 *	0.00	0.00
2	15	4.4	20	1.04 a	1.04 a	1.05 a	1.04 *	0.01	0.96
3	8a	3.31	31	1.13 a	1.13 a	1.12 a	1.13	0.01	0.88
4	20	5.1	31	1.16 a	1.17 a	1.17 a	1.17	0.01	0.85
5	41	4.1	31	1.18	1.18	1.19	1.18	0.01	0.85
6	13	3.3	20	1.19	1.17	1.20	1.19	0.02	1.68
7	9	5.1	31	1.20	1.20	1.21	1.20	0.01	0.83
8	22	0	0	1.21	1.21	1.30 b	1.22	0.05	4.10
9	42	4.1	31	1.24	1.24	1.26	1.25	0.01	0.80
10	31	3.5	20	1.28	1.27	1.18 b	1.26	0.06	4.76
11	14	4.1	20	1.26	1.25	1.34 b	1.27	0.05	3.94
12	44	4.1	31	1.27	1.21 b	1.32 b	1.27	0.06	4.72
13	45	3.3	31	1.28	1.26	1.27	1.27	0.01	0.79
14	6	5.6	31	1.28	1.28	1.28	1.28	0.00	0.00
15	8	3.91	31	1.29	1.28	1.28	1.28	0.01	0.78
16	17	5.4	31	1.26	1.28	1.29	1.28	0.02	1.56
17	40	5.5	31	1.20 b	1.29	1.29	1.28	0.05	3.91
18	4	2	40	1.29	1.28	1.31	1.29	0.02	1.55
19	23	3.3	31	1.31	1.29	0.80 b	1.29	0.29	22.48
20	29	5.1	31	1.30	1.28	1.30	1.29	0.01	0.78
21	4a	2	41	1.31	1.30	1.29	1.30	0.01	0.77
22	5	3.3	20	1.30	1.30	1.30	1.30	0.00	0.00
23	49	4.1	31	1.30	1.31	1.29	1.30	0.01	0.77
24	18	3.8	31	1.31	1.33	1.23 b	1.31	0.05	3.82
25	23a	6.1	31	0.71 b	1.33	1.31	1.31	0.35	26.72
26	38	4.3	31	1.31	1.32	1.30	1.31	0.01	0.76
27	50	4.1	31	1.32	1.31	1.31	1.31	0.01	0.76
28	30	3.6	20	1.32	1.29 b	1.34	1.32	0.03	2.27
29	39	5.4	31	1.32	1.32	1.31	1.32	0.01	0.76
30	46	5.6	31	1.29 b	1.34	1.32	1.32	0.03	2.27
31	37	6.1	30	1.35	1.33	1.36	1.35	0.02	1.48
32	3	3.7	31	1.37	1.35	1.36	1.36	0.01	0.74
33	24	6.5	20	1.38	1.36	1.32 b	1.36	0.03	2.21
34	43	4.1	31	1.35	1.36	1.37	1.36	0.01	0.74
35	48	4.1	31	1.37	1.36	1.38	1.37	0.01	0.73
36	1	3.6	20	1.41	1.40	1.30 b	1.39	0.06	4.32
37	7	3.2	31	1.37	1.40	1.39	1.39	0.02	1.44
38	21	5.4	31	1.42 b	1.38	1.38	1.39	0.02	1.44
39	12	5.1	31	1.39	1.40	1.48 b	1.41	0.05	3.55
40	26	3.2	31	1.42	1.47 b	1.41	1.43	0.03	2.10
41	2	5.2	31	1.43	1.44	1.46	1.44	0.02	1.39
42	51	2	41	1.43	1.45	1.43	1.44	0.01	0.69
43	28	8.3	20	1.44	1.53 b	1.45	1.46	0.05	3.42
44	47	4.1	31	1.47	1.46	1.46	1.46	0.01	0.68
45	36	3.3	20	1.50 b	1.46	1.45	1.47	0.03	2.04
46	10	6.1	20	1.57 a	1.57 a	1.57 a	1.57 *	0.00	0.00
47	19	5.4	20	1.64 ab	1.69 a	1.83 ab	1.69 *	0.10	5.92
48	25	5.1	31	1.93 a	1.89 ab	1.98 ab	1.93 *	0.05	2.59
49	11	6.1	70	2.17 ab	2.43 ab	2.35 a	2.35 *	0.13	5.53

Mean	Interlab.std. deviation abs.	Interlab.std. deviation rel.%
1.32	**0.04**	**2.78**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	49
	Percentage of non-tolerable lab means:	12.2
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	1.30

ICP-Forests 3rd needle/leaf labtest 97/98

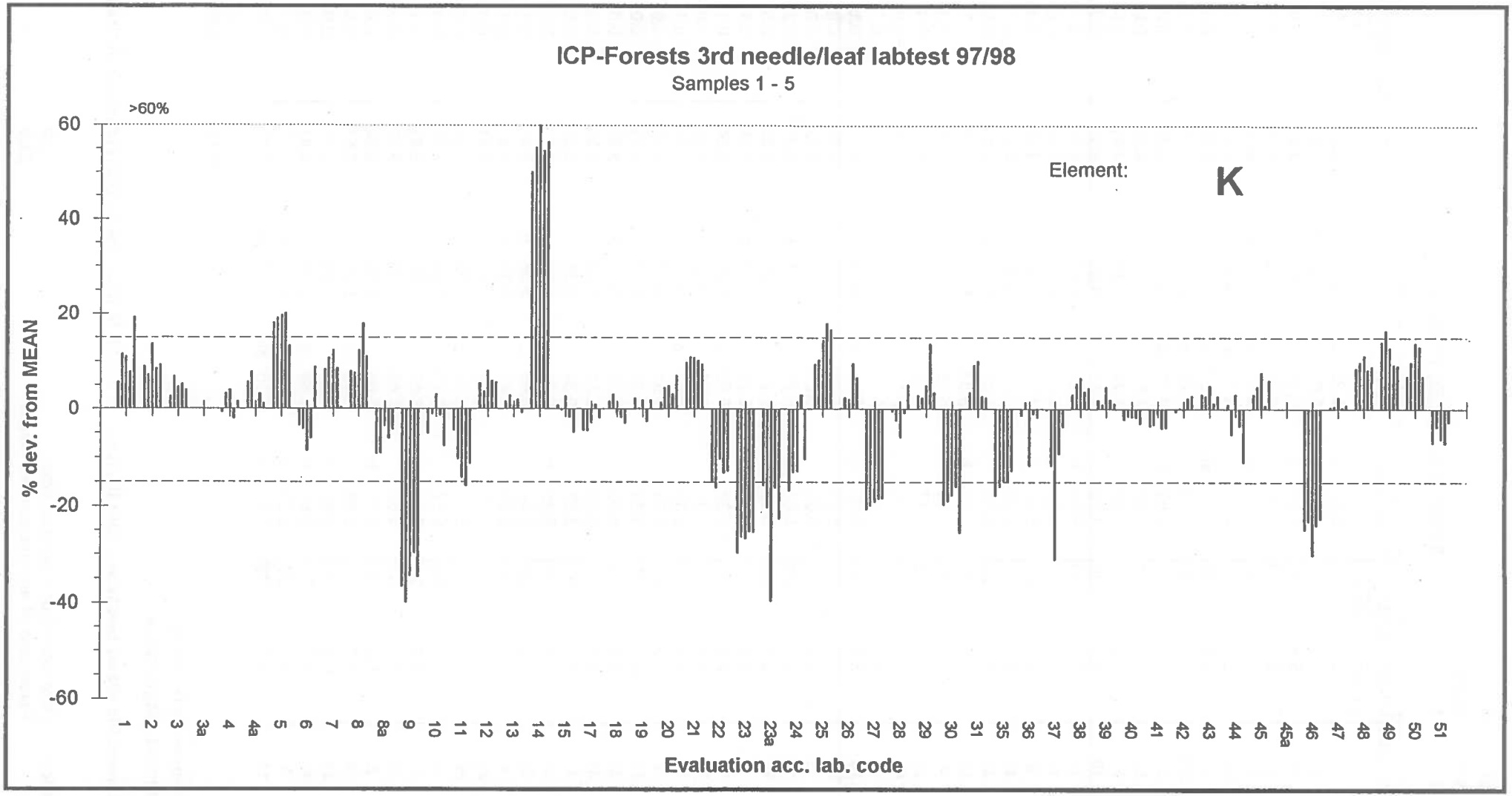
Element: Mg
Dimension: mg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	23a	6.1	31	0.94 ab	0.48 a	0.36 ab	**0.48 ***	0.31	64.58
2	23	3.3	31	0.84 ab	0.64 ab	0.71 a	**0.71 ***	0.10	14.08
3	27	6.1	20	0.83 ab	0.78 a	0.78 a	**0.79 ***	0.03	3.80
4	15	4.4	20	0.83 a	0.91 ab	0.79 ab	**0.83 ***	0.06	7.23
5	8a	3.31	31	0.88	0.88	0.88	**0.88**	0.00	0.00
6	13	3.3	20	0.91	0.90	0.88	**0.90**	0.02	2.22
7	20	5.1	31	0.91	0.91	0.91	**0.91**	0.00	0.00
8	41	4.1	31	0.90	0.91	0.91	**0.91**	0.01	1.10
9	24	6.5	20	1.01 b	0.92	0.92	**0.93**	0.05	5.38
10	31	3.5	20	0.95	0.90 b	0.93	**0.93**	0.03	3.23
11	17	5.4	31	0.95	0.93	0.99 b	**0.95**	0.03	3.16
12	44	4.1	31	0.95	1.07 b	0.92 b	**0.95**	0.08	8.42
13	6	5.6	31	0.95	0.97	0.96	**0.96**	0.01	1.04
14	14	4.1	20	0.96	1.03 b	0.88 b	**0.96**	0.08	8.33
15	4	2	40	0.99	0.97	0.94 b	**0.97**	0.03	3.09
16	22	0	0	0.98	0.99	0.93 b	**0.97**	0.03	3.09
17	9	5.1	31	0.98	0.97	0.98	**0.98**	0.01	1.02
18	5	3.3	20	1.00	1.00	1.00	**1.00**	0.00	0.00
19	18	3.8	31	1.03 b	0.98	1.00	**1.00**	0.03	3.00
20	39	5.4	31	1.00	1.01	0.99	**1.00**	0.01	1.00
21	40	5.5	31	1.00	1.01	0.99	**1.00**	0.01	1.00
22	42	4.1	31	1.00	1.01	1.01	**1.01**	0.01	0.99
23	49	4.1	31	1.00	1.05 b	1.00	**1.01**	0.03	2.97
24	4a	2	41	1.02	1.02	1.01	**1.02**	0.01	0.98
25	7	3.2	31	1.01	1.02	1.03	**1.02**	0.01	0.98
26	8	3.91	31	1.01	1.01	1.03	**1.02**	0.01	0.98
27	38	4.3	31	1.02	1.02	1.02	**1.02**	0.00	0.00
28	45	3.3	31	1.02	1.03	1.02	**1.02**	0.01	0.98
29	50	4.1	31	1.03	1.03	1.02	**1.03**	0.01	0.97
30	48	4.1	31	1.03	1.06	1.04	**1.04**	0.02	1.92
31	51	2	41	1.05	1.04	1.03	**1.04**	0.01	0.96
32	3	3.7	31	1.05	1.05	1.06	**1.05**	0.01	0.95
33	12	5.1	31	1.03 b	1.06	1.07	**1.05**	0.02	1.90
34	43	4.1	31	1.05	1.06	1.04	**1.05**	0.01	0.95
35	46	5.6	31	1.04	1.04	1.10 b	**1.05**	0.03	2.86
36	37	6.1	30	1.07	1.05	1.06	**1.06**	0.01	0.94
37	1	3.6	20	1.05	1.07	1.09	**1.07**	0.02	1.87
38	28	8.3	20	1.09	1.09	1.06	**1.08**	0.02	1.85
39	29	5.1	31	1.06 b	1.10	1.09	**1.08**	0.02	1.85
40	21	5.4	31	1.08	1.10	1.10	**1.09**	0.01	0.92
41	30	3.6	20	1.06 b	1.12	1.10	**1.10**	0.03	2.73
42	36	3.3	20	1.17 b	1.11	1.09	**1.11**	0.04	3.60
43	2	5.2	31	1.11	1.12	1.12	**1.12**	0.01	0.89
44	26	3.2	31	1.09 b	1.12	1.19 b	**1.12**	0.05	4.46
45	47	4.1	31	1.11 b	1.15	1.14	**1.13**	0.02	1.77
46	10	6.1	20	1.14	1.12	1.25 b	**1.14**	0.07	6.14
47	25	5.1	31	1.35 ab	1.38 a	1.43 ab	**1.38 ***	0.04	2.90
48	19	5.4	20	1.35 ab	1.56 a	1.55 a	**1.54 ***	0.12	7.79
49	11	6.1	70	2.47 ab	1.93 ab	2.17 a	**2.17 ***	0.27	12.44
							Mean	Interlab.std. deviation	
								abs.	rel.%
							1.02	**0.04**	**4.15**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **49**
Percentage of non-tolerable lab means: **14.3**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>60%
Element:
K
% dev. from MEAN
60
40
20
0
-20
-40
-60
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
27
28
29
30
31
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36
37
38
39
40
41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: K
Dimension: mg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	9	5.1	31	3.33 a	3.25 a	3.24 a	3.27 *	0.05	1.53
2	23	3.3	31	3.57 a	3.67 a	3.64 a	3.63 *	0.05	1.38
3	46	5.6	31	3.84 a	3.88 a	3.92 a	3.88 *	0.04	1.03
4	27	6.1	20	4.10 a	4.26 ab	3.90 ab	4.10 *	0.18	4.39
5	30	3.6	20	4.34 ab	4.15 a	4.05 ab	4.15 *	0.15	3.61
6	35	3.6	20	4.25 a	4.13 ab	4.30 a	4.25 *	0.09	2.12
7	24	6.5	30	4.21 ab	4.32 a	4.32 a	4.30 *	0.06	1.40
8	23a	6.1	31	4.32 a	4.40 a	4.35 a	4.36 *	0.04	0.92
9	22	0	0	4.52 ab	4.11 ab	4.40 a	4.40 *	0.21	4.77
10	8a	3.31	31	4.69	4.68	4.70	4.69	0.01	0.21
11	51	2	41	4.82	4.76	4.84	4.81	0.04	0.83
12	10	6.1	20	4.93	4.94	4.86	4.91	0.04	0.81
13	11	6.1	30	5.11 b	4.94	4.83 b	4.94	0.14	2.83
14	17	5.4	31	5.01 b	4.92	4.91	4.94	0.06	1.21
15	6	5.6	31	5.02	4.96	4.98	4.99	0.03	0.60
16	41	4.1	31	4.99	4.95	5.32 b	4.99	0.20	4.01
17	40	5.5	31	5.05	5.03	5.18 b	5.06	0.08	1.58
18	36	6.2	31	5.29 b	5.08	5.08	5.10	0.12	2.35
19	4	2	40	5.10	5.15	5.15	5.13	0.03	0.58
20	28	8.3	20	5.17	5.16	5.08	5.14	0.05	0.97
21	42	4.1	31	5.14	5.13	5.16	5.14	0.02	0.39
22	37	6.1	30	5.18	5.15	5.16	5.16	0.02	0.39
23	26	3.2	31	5.32 b	5.02 b	5.19	5.19	0.15	2.89
24	47	4.1	31	5.23	5.13	5.21	5.20	0.05	0.96
25	15	4.4	30	5.23	5.25	5.17	5.22	0.04	0.77
26	44	4.1	31	5.68 b	5.23	4.91 b	5.23	0.39	7.46
27	20	5.1	20	5.25	5.24	5.25	5.25	0.01	0.19
28	13	3.3	30	5.35 b	5.26	5.13 b	5.26	0.11	2.09
29	18	3.8	31	5.28	5.09 b	5.29	5.26	0.11	2.09
30	39	5.4	31	5.33	5.24	5.28	5.28	0.05	0.95
31	19	5.4	20	5.30	5.14 b	5.35	5.30	0.11	2.08
32	3	3.7	31	5.33	5.31	5.32	5.32	0.01	0.19
33	29	5.1	31	5.34	5.34	5.31	5.33	0.02	0.38
34	38	4.3	31	5.35	5.37	5.25 b	5.34	0.06	1.12
35	43	4.1	31	5.38	5.31	5.33	5.34	0.04	0.75
36	45	3.3	31	5.32	5.34	5.35	5.34	0.02	0.37
37	31	3.5	20	5.26 b	5.38	5.38	5.36	0.07	1.31
38	12	5.1	31	5.30 b	5.46	5.55 b	5.46	0.13	2.38
39	1	3.6	30	5.38 b	5.47	5.71 b	5.47	0.17	3.11
40	4a	2	41	5.47	5.48	5.45	5.47	0.02	0.37
41	50	4.1	31	5.51	5.67 b	5.53	5.54	0.09	1.62
42	8	3.91	31	5.57	5.57	5.66	5.59	0.05	0.89
43	7	3.2	31	5.44 b	5.65	5.61	5.61	0.11	1.96
44	48	4.1	31	5.60	5.66	5.60	5.62	0.03	0.53
45	2	5.2	31	5.76 b	5.64	5.34 b	5.64	0.22	3.90
46	25	5.1	31	5.68	5.59 b	5.70	5.67	0.06	1.06
47	21	5.4	31	5.80 b	5.64	5.68	5.68	0.08	1.41
48	49	4.1	31	5.91 a	5.88 a	5.94 a	5.91	0.03	0.51
49	5	3.3	30	6.09 a	6.14 a	6.14 a	6.12 *	0.03	0.49
50	14	4.1	20	7.77 a	7.18 ab	8.47 ab	7.77 *	0.65	8.37
								abs.	rel.%
							5.18	0.08	1.63

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**50**
	Percentage of non-tolerable lab means:	**22.0**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: K
Dimension: mg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	9	5.1	31	3.08	a	3.10	a	3.04	a	3.07 *	0.03	0.98
2	23	3.3	31	3.78	a	3.69	a	3.79	a	3.76 *	0.06	1.60
3	46	5.6	31	3.91	a	3.89	a	3.97	a	3.92 *	0.04	1.02
4	23a	6.1	31	4.07	a	4.06	a	4.07	a	4.07 *	0.01	0.25
5	27	6.1	20	4.10	a	4.12	a	3.96	ab	4.09 *	0.09	2.20
6	30	3.6	20	4.15	a	4.17	a	4.11	a	4.14 *	0.03	0.72
7	22	0	0	4.28		4.14	b	4.46	b	4.28 *	0.16	3.74
8	35	3.6	20	4.32		4.30		4.24		4.29 *	0.04	0.93
9	24	6.5	30	4.44		4.44		4.44		4.44	0.00	0.00
10	37	6.1	30	4.45		4.51		4.56		4.51	0.06	1.33
11	11	6.1	30	4.70	b	4.53		4.58		4.58	0.09	1.97
12	8a	3.31	31	4.61		4.66		4.64		4.64	0.03	0.65
13	44	4.1	31	5.43	b	4.29	b	4.84		4.84	0.57	11.78
14	17	5.4	31	5.11	b	4.85		4.86		4.88	0.15	3.07
15	6	5.6	31	4.83		4.98	b	4.90		4.90	0.08	1.63
16	51	2	41	4.95		4.94		4.87		4.92	0.04	0.81
17	41	4.1	31	4.95		4.91		5.00		4.95	0.05	1.01
18	28	8.3	20	5.01		5.01		4.96		4.99	0.03	0.60
19	40	5.5	31	5.03		4.94	b	5.17	b	5.03	0.12	2.39
20	10	6.1	20	5.01		5.16	b	5.05		5.05	0.08	1.58
21	15	4.4	30	5.10		5.05		5.17		5.10	0.06	1.18
22	19	5.4	20	5.13		4.95	b	5.42	b	5.13	0.24	4.68
23	42	4.1	31	5.12		5.10		5.21		5.13	0.06	1.17
24	47	4.1	31	5.15		5.25	b	5.07	b	5.15	0.09	1.75
25	39	5.4	31	5.18		5.20		5.13		5.17	0.04	0.77
26	36	6.2	31	5.25		5.17		5.17		5.19	0.05	0.96
27	26	3.2	31	5.07	b	5.24		5.37	b	5.24	0.15	2.86
28	29	5.1	31	5.24		5.23		5.24		5.24	0.01	0.19
29	43	4.1	31	5.25		5.29		5.24		5.26	0.03	0.57
30	13	3.3	30	5.25		5.43	b	5.25		5.27	0.10	1.90
31	18	3.8	31	5.25		5.34		5.27		5.28	0.05	0.95
32	4	2	40	5.30		5.29		5.29		5.29	0.01	0.19
33	12	5.1	31	5.35		5.17	b	5.31		5.31	0.09	1.69
34	20	5.1	20	5.40		5.33		5.32		5.35	0.04	0.75
35	45	3.3	31	5.43		5.33		5.35		5.36	0.05	0.93
36	38	4.3	31	5.40		5.31	b	5.43		5.39	0.06	1.11
37	3	3.7	31	5.50		5.44		5.48		5.47	0.03	0.55
38	2	5.2	31	5.49		5.11	b	5.54		5.49	0.24	4.37
39	8	3.91	31	5.51		5.51		5.52		5.51	0.01	0.18
40	4a	2	41	5.55		5.54		5.46		5.52	0.05	0.91
41	31	3.5	20	5.46	b	5.59		5.69	b	5.59	0.12	2.15
42	48	4.1	31	5.66		5.62		5.53	b	5.62	0.07	1.25
43	50	4.1	31	5.62		5.69		5.53	b	5.62	0.08	1.42
44	25	5.1	31	5.58		5.69		5.65		5.65	0.06	1.06
45	7	3.2	31	5.67		5.57	b	5.71		5.67	0.07	1.23
46	21	5.4	31	5.84	b	5.64		5.68		5.68	0.11	1.94
47	1	3.6	30	5.71		5.79	b	5.54	b	5.71	0.13	2.28
48	49	4.1	31	5.96		6.05	b	5.86	b	5.96 *	0.10	1.68
49	5	3.3	30	6.08	a	6.18	a	6.08	a	6.10 *	0.06	0.98
50	14	4.1	20	7.95	a	7.00	ab	8.20	ab	7.95 *	0.63	7.92
											abs.	rel.%
										5.12	0.08	1.63

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **50**
Percentage of non-tolerable lab means: **22.0**

Element: K
Dimension: mg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications						Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	23a	6.1	31	3.01	ab	3.29	ab	3.18	a	3.18 *	0.14	4.40
2	9	5.1	31	3.44	a	3.41	a	3.55	ab	3.45 *	0.07	2.03
3	37	6.1	30	3.65	a	3.60	a	3.64	a	3.63 *	0.03	0.83
4	46	5.6	31	3.64	a	3.67	a	3.81	ab	3.68 *	0.09	2.45
5	23	3.3	31	3.90	a	3.86	a	3.75	ab	3.86 *	0.08	2.07
6	27	6.1	20	4.20	a	4.30	a	4.26	a	4.26 *	0.05	1.17
7	30	3.6	20	4.12	b	4.33		4.43	b	4.33 *	0.16	3.70
8	35	3.6	20	4.50		4.51		4.47		4.49	0.02	0.45
9	11	6.1	30	4.52		4.54		4.50		4.52	0.02	0.44
10	24	6.5	30	4.75	b	4.59		4.49	b	4.59	0.13	2.83
11	36	6.2	31	4.66		4.62		4.66		4.65	0.02	0.43
12	22	0	0	4.80	b	4.72		4.66		4.72	0.07	1.48
13	6	5.6	31	4.73	b	4.94	b	4.81		4.81	0.11	2.29
14	51	2	41	5.00		4.83	b	4.94		4.94	0.09	1.82
15	28	8.3	20	5.14	b	4.84	b	4.96		4.96	0.15	3.02
16	8a	3.31	31	4.88	b	5.10		5.10		5.08	0.13	2.56
17	17	5.4	31	5.10		5.10		5.20	b	5.12	0.06	1.17
18	40	5.5	31	5.22		5.16		5.15		5.18	0.04	0.77
19	18	3.8	31	5.20		5.19		5.38	b	5.22	0.11	2.11
20	41	4.1	31	5.20		5.23		5.24		5.22	0.02	0.38
21	42	4.1	31	5.24		5.25		5.30		5.26	0.03	0.57
22	4a	2	41	5.30		5.28		5.27		5.28	0.02	0.38
23	13	3.3	30	5.39		5.29		5.31		5.32	0.05	0.94
24	19	5.4	20	5.38		5.32		5.63	b	5.38	0.16	2.97
25	26	3.2	31	5.37		5.37		5.55	b	5.39	0.10	1.86
26	47	4.1	31	5.39		5.43		5.42		5.41	0.02	0.37
27	15	4.4	30	5.38		5.44		5.43		5.42	0.03	0.55
28	10	6.1	20	5.47		5.42		5.44		5.44	0.03	0.55
29	44	4.1	31	5.46		5.47		5.34	b	5.44	0.07	1.29
30	4	2	40	5.48		5.53		5.47		5.49	0.03	0.55
31	3	3.7	31	5.48		5.64	b	5.51		5.52	0.09	1.63
32	39	5.4	31	5.51		5.53		5.51		5.52	0.01	0.18
33	20	5.1	20	5.50		5.52		5.73	b	5.53	0.13	2.35
34	29	5.1	31	5.49		5.64	b	5.54		5.54	0.08	1.44
35	43	4.1	31	5.55		5.49		5.57		5.54	0.04	0.72
36	38	4.3	31	5.64		5.64		5.54	b	5.62	0.06	1.07
37	45	3.3	31	5.67		5.69		5.67		5.68	0.01	0.18
38	12	5.1	31	5.73		5.61	b	5.72		5.70	0.07	1.23
39	31	3.5	20	5.81		5.99	b	5.48	b	5.81	0.26	4.48
40	21	5.4	31	5.82		5.86		5.88		5.85	0.03	0.51
41	1	3.6	30	5.86		5.94	b	5.77	b	5.86	0.09	1.54
42	48	4.1	31	5.86		5.86		5.90		5.87	0.02	0.34
43	7	3.2	31	5.99		5.90		5.91		5.93	0.05	0.84
44	8	3.91	31	5.93		5.91		5.95		5.93	0.02	0.34
45	49	4.1	31	5.96		6.00		5.92		5.96	0.04	0.67
46	2	5.2	31	4.97	b	6.00		6.35	b	6.00	0.72	12.00
47	50	4.1	31	6.01		5.94		6.15	b	6.01	0.11	1.83
48	25	5.1	31	5.91	b	6.08		6.05		6.04	0.09	1.49
49	5	3.3	30	6.37	a	6.32	a	6.27	a	6.32 *	0.05	0.79
50	14	4.1	20	8.92	a	9.50	ab	7.90	ab	8.92 *	0.81	9.08
											abs.	rel.%
										5.28	0.08	1.63

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	18.0

ICP-Forests 3rd needle/leaf labtest 97/98

Element: K
Dimension: mg/g
Sample: 4 **OAK LEAVES (Spain)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	9	5.1	31	2.89	a	2.93	a	2.82	ab	2.89	*	0.06	2.08
2	23	3.3	31	3.08	a	3.21	ab	2.98	ab	3.08	*	0.12	3.90
3	46	5.6	31	3.10	a	3.20	ab	3.12	a	3.13	*	0.05	1.60
4	27	6.1	20	3.36	a	3.36	a	3.36	a	3.36	*	0.00	0.00
5	23a	6.1	31	3.63	b	3.44		3.42		3.45	*	0.12	3.48
6	30	3.6	20	3.31	b	3.46		3.57	b	3.46	*	0.13	3.76
7	11	6.1	30	3.49		3.50		3.35	b	3.47	*	0.08	2.31
8	35	3.6	20	3.56		3.49		3.49		3.51		0.04	1.14
9	22	0	0	3.45	b	3.58		3.68	b	3.58		0.12	3.35
10	37	6.1	30	3.70		3.75		3.78		3.74		0.04	1.07
11	51	2	41	3.80		3.82		3.86		3.83		0.03	0.78
12	6	5.6	31	3.87		3.86		3.87		3.87		0.01	0.26
13	8a	3.31	31	3.90		3.88		3.80	b	3.87		0.05	1.29
14	41	4.1	31	3.96		3.95		3.97		3.96		0.01	0.25
15	44	4.1	31	3.86	b	3.98		4.14	b	3.98		0.14	3.52
16	19	5.4	20	3.98		4.01		4.16	b	4.02		0.10	2.49
17	4	2	40	4.05		4.04		4.02		4.04		0.02	0.50
18	15	4.4	30	4.05		4.09		4.02		4.05		0.04	0.99
19	18	3.8	31	4.06		4.08		3.78	b	4.05		0.17	4.20
20	40	5.5	31	4.12	b	3.97	b	4.05		4.05		0.08	1.98
21	10	6.1	20	4.16	b	4.01		4.07		4.07		0.08	1.97
22	36	6.2	31	4.08		4.12		4.04		4.08		0.04	0.98
23	28	8.3	20	4.09		4.09		4.08		4.09		0.01	0.24
24	47	4.1	31	4.11		4.13		4.27	b	4.14		0.09	2.17
25	45	3.3	31	4.18		4.12		4.17		4.16		0.03	0.72
26	17	5.4	31	3.95	b	4.20		4.18		4.17		0.14	3.36
27	43	4.1	31	4.20		4.17		4.18		4.18		0.02	0.48
28	13	3.3	30	4.22		4.25		4.17		4.21		0.04	0.95
29	39	5.4	31	4.21		4.17		4.24		4.21		0.04	0.95
30	42	4.1	31	4.21		4.19		4.28		4.22		0.05	1.18
31	31	3.5	20	4.28		4.13	b	4.25		4.24		0.08	1.89
32	24	6.5	30	4.17	b	4.27		4.27		4.25		0.06	1.41
33	4a	2	41	4.25		4.25		4.27		4.26		0.01	0.23
34	20	5.1	20	4.27		4.20		4.29		4.26		0.05	1.17
35	38	4.3	31	4.28		4.30		4.26		4.28		0.02	0.47
36	3	3.7	31	4.36		4.33		4.32		4.34		0.02	0.46
37	12	5.1	31	4.34		4.38		4.40		4.37		0.03	0.69
38	1	3.6	30	4.43		4.59	b	4.43		4.45		0.09	2.02
39	48	4.1	31	4.42		4.56	b	4.47		4.47		0.07	1.57
40	2	5.2	31	4.42		4.48		4.56	b	4.48		0.07	1.56
41	7	3.2	31	4.35	b	4.51		4.50		4.48		0.09	2.01
42	49	4.1	31	4.51		4.39	b	4.63	b	4.51		0.12	2.66
43	26	3.2	31	4.52		4.64	b	4.44	b	4.52		0.10	2.21
44	21	5.4	31	4.52		4.54		4.58		4.55		0.03	0.66
45	50	4.1	31	4.67		4.72		4.53	b	4.67		0.10	2.14
46	29	5.1	31	4.70		4.70		4.66		4.69		0.02	0.43
47	8	3.91	31	4.91	a	4.87	a	4.81	a	4.87	*	0.05	1.03
48	25	5.1	31	4.83	a	4.86	a	4.95	ab	4.87	*	0.06	1.23
49	5	3.3	30	5.01	a	4.96	a	4.81	ab	4.96	*	0.10	2.02
50	14	4.1	20	6.38	a	6.61	ab	6.10	ab	6.38	*	0.26	4.08
												abs.	rel.%
										4.13		0.06	1.59

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	22.0
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	4.07

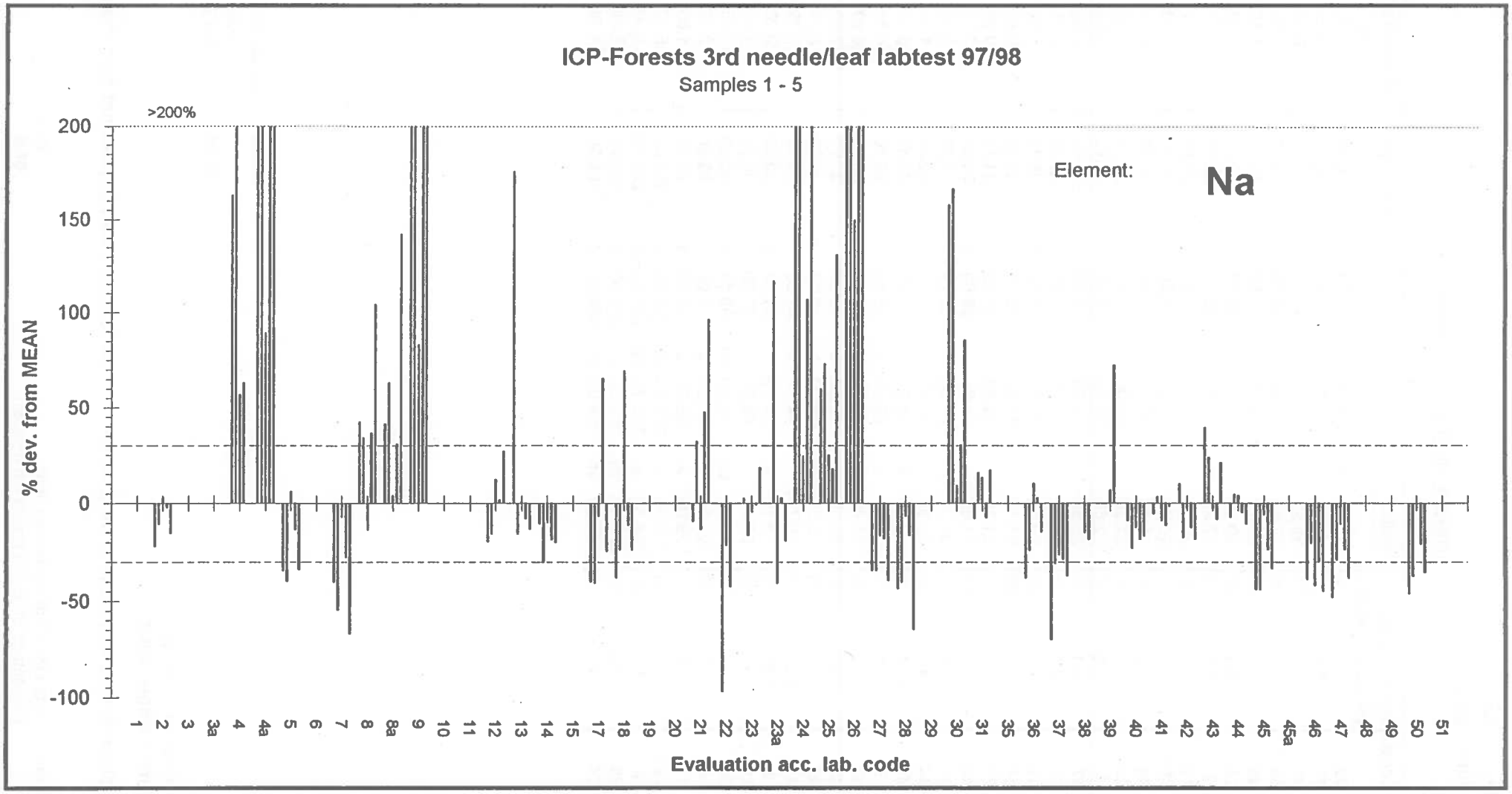
Element: K
Dimension: mg/g
Sample: 5 BEECH LEAVES (Slovenia)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	9	5.1	31	4.45 a	4.45 a	4.40 a	4.43 *	0.03	0.68
2	30	3.6	20	5.11 a	5.01 a	5.02 a	5.05 *	0.06	1.19
3	23	3.3	31	5.08 a	4.43 ab	5.10 a	5.06 *	0.38	7.51
4	23a	6.1	31	5.49 ab	5.25 a	5.10 ab	5.25 *	0.20	3.81
5	46	5.6	31	5.13 ab	5.25 a	5.43 ab	5.25 *	0.15	2.86
6	27	6.1	20	5.50 a	5.56 a	5.56 a	5.54 *	0.03	0.54
7	22	0	0	5.99	5.74 b	5.92	5.92	0.13	2.20
8	35	3.6	20	5.92	5.97	5.88	5.92	0.05	0.84
9	11	6.1	30	5.92 b	6.02	6.20 b	6.02	0.14	2.33
10	44	4.1	31	6.04	6.65 b	5.66 b	6.04	0.50	8.28
11	24	6.5	30	6.01	6.11	6.11	6.08	0.06	0.99
12	10	6.1	20	6.39 b	6.17 b	6.27	6.27	0.11	1.75
13	15	4.4	30	6.49	6.47	6.43	6.46	0.03	0.46
14	8a	3.31	31	6.51	6.50	6.48	6.50	0.02	0.31
15	41	4.1	31	6.51	6.56	6.53	6.53	0.03	0.46
16	37	6.1	30	6.57	6.51	6.55	6.54	0.03	0.46
17	18	3.8	31	6.82 b	6.49 b	6.59	6.59	0.17	2.58
18	40	5.5	31	6.52	6.65	6.60	6.59	0.07	1.06
19	51	2	41	6.57	6.67	6.60	6.61	0.05	0.76
20	17	5.4	31	6.66	6.48 b	6.84 b	6.66	0.18	2.70
21	36	6.2	31	6.68	6.68	6.64	6.67	0.02	0.30
22	13	3.3	30	6.82	6.73	6.42 b	6.73	0.21	3.12
23	7	3.2	31	6.81	6.79	7.01 b	6.83	0.12	1.76
24	47	4.1	31	6.80	6.97 b	6.85	6.86	0.09	1.31
25	4a	2	41	6.92	6.88	6.84	6.88	0.04	0.58
26	39	5.4	31	6.96	6.78 b	6.88	6.88	0.09	1.31
27	4	2	40	6.89	6.92	6.93	6.91	0.02	0.29
28	19	5.4	20	6.91	6.89	7.02	6.93	0.07	1.01
29	31	3.5	20	7.06 b	6.96	6.87	6.96	0.10	1.44
30	43	4.1	31	6.96	7.03	6.94	6.98	0.05	0.72
31	42	4.1	31	6.96	7.03	6.97	6.99	0.04	0.57
32	29	5.1	31	7.00	7.01	7.13	7.04	0.07	0.99
33	3	3.7	31	7.02	7.11	7.08	7.07	0.05	0.71
34	38	4.3	31	7.05	7.12	7.12	7.10	0.04	0.56
35	28	8.3	20	7.19	7.16	7.03 b	7.14	0.09	1.26
36	12	5.1	31	7.32 b	7.15	7.15	7.18	0.10	1.39
37	45	3.3	31	7.21	7.25	7.18	7.21	0.04	0.55
38	26	3.2	31	7.09 b	7.26	7.30	7.25	0.11	1.52
39	50	4.1	31	7.11 b	7.30	7.30	7.27	0.11	1.51
40	20	5.1	20	7.32	7.28	7.25	7.28	0.04	0.55
41	6	5.6	31	7.29 b	7.49	7.40	7.40	0.10	1.35
42	48	4.1	31	7.37	7.45	7.41	7.41	0.04	0.54
43	49	4.1	31	7.42	7.51	7.27 b	7.42	0.12	1.62
44	2	5.2	31	7.39	7.45	7.46	7.43	0.04	0.54
45	21	5.4	31	7.42	7.50	7.40	7.44	0.05	0.67
46	8	3.91	31	7.48	7.58	7.59	7.55	0.06	0.79
47	5	3.3	30	7.70	7.75	7.65	7.70	0.05	0.65
48	25	5.1	31	7.97 a	7.81 ab	7.95 a	7.93 *	0.09	1.13
49	1	3.6	30	7.85 ab	8.19 a	8.11 a	8.11 *	0.18	2.22
50	14	4.1	20	10.64 a	10.81 ab	9.91 ab	10.64 *	0.48	4.51
								abs.	rel.%
							6.80	0.09	1.48

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	50
	Percentage of non-tolerable lab means:	18.0


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Na
>200%
200
150
100
50
0
-50
-100
% dev. from MEAN
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
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21
22
23
23a
24
25
26
27
28
29
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31
35
36
37
38
39
40
41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

Element: Na
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	22	0	0	0.00	a	0.00	a	0.00	a	0.00 *	0.00	
2	37	6.1	32	10.20		10.70		10.40		10.43 *	0.25	2.40
3	47	4.1	31	18.20		18.30		18.10		18.20 *	0.10	0.55
4	50	4.1	31	17.50		18.40		20.70		18.87 *	1.65	8.74
5	45	3.1	31	20.70		18.50		19.60		19.60 *	1.10	5.61
6	28	5.1	20	20.90		19.90		18.40		19.73 *	1.26	6.39
7	7	3.2	31	17.90	b	23.30		20.90		20.90 *	2.71	12.97
8	17	5.4	31	20.20		21.20		21.60		21.00 *	0.72	3.43
9	46	5.6	31	20.30		22.50		21.50		21.43 *	1.10	5.13
10	18	6.5	31	21.40		22.00		21.60		21.67 *	0.31	1.43
11	36	3.3	31	21.20		21.00		23.00		21.73 *	1.10	5.06
12	5	3.3	30	22.60		24.10		22.10		22.93 *	1.04	4.54
13	27	6.1	20	25.50		22.00		22.00		23.00 *	2.02	8.78
14	2	5.2	31	27.30		30.00		25.20		27.30	2.41	8.83
15	12	5.1	31	28.10		20.80	b	38.50	b	28.10	8.90	31.67
16	14	4.1	20	31.10		30.60		32.20		31.30	0.82	2.62
17	21	5.4	31	31.30		32.80		31.20		31.77	0.90	2.83
18	40	5.5	31	31.80		34.30		28.80	b	31.80	2.75	8.65
19	31	3.5	20	32.30		29.50		36.20	b	32.30	3.37	10.43
20	44	4.1	31	33.80		31.10				32.45	1.91	5.89
21	41	4.1	31	38.00	b	32.00		32.20		33.10	3.41	10.30
22	23a	6.1	31	20.70	b	49.40	b	35.10		35.10	14.35	40.88
23	23	3.3	31	41.40	b	24.10	b	36.10		36.10	8.86	24.54
24	42	4.1	31	39.20		35.20	b	40.20		38.70	2.65	6.85
25	43	4.1	31	55.00	b	39.00	b	49.00		49.00 *	8.08	16.49
26	8a	3.31	31	49.70		54.60	b	47.30		49.70 *	3.72	7.48
27	8	3.91	31	43.70	b	50.10		61.90	b	50.10 *	9.23	18.42
28	25	5.1	31	56.10		55.30		57.30		56.23 *	1.01	1.80
29	30	6.1	30	110.00	ab	78.80	ab	90.60	a	90.60 *	15.75	17.38
30	4	2	40	94.00	a	91.00	a	0.00		92.50 *	2.12	2.29
31	13	3.3	30	98.00	a	95.90	a	96.70	a	96.87 *	1.06	1.09
32	4a	2	41	210.00	a	200.00	ab	210.00	a	209.00 *	5.77	2.76
33	9	5.1	31	234.30	a	220.70	ab	237.60	ab	234.30 *	8.96	3.82
34	26	3.2	31	222.20	ab	268.30	ab	252.00	a	252.00 *	23.38	9.28
35	24	6.5	30	487.00	ab	408.00	ab	468.00	a	468.00 *	41.24	8.81

Mean	Interlab.std. deviation	
	abs.	rel.%
35.13	**5.26**	**9.06**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	35
	Percentage of non-tolerable lab means:	68.6

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Na
Dimension: µg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**22**	0	0	10.00	ab	0.00	a	0.00	a	**1.00** *	5.77	577.00
2	**7**	3.2	31	25.50	b	15.20		13.80		**15.50** *	6.39	41.23
3	**45**	3.1	31	19.80		18.80		18.80		**19.13** *	0.58	3.03
4	**17**	5.4	31	20.10		20.30		20.30		**20.23** *	0.12	0.59
5	**28**	5.1	20	20.40		20.00		20.70		**20.37** *	0.35	1.72
6	**5**	3.3	30	20.60		21.60		19.60		**20.60** *	1.00	4.85
7	**50**	4.1	31	20.10		21.60		22.50		**21.40** *	1.21	5.65
8	**27**	6.1	20	22.00		21.00		26.50	b	**22.50** *	2.93	13.02
9	**37**	6.1	32	23.70		23.80		23.50		**23.67** *	0.15	0.63
10	**14**	4.1	20	23.80		20.60	b	28.40	b	**23.80** *	3.92	16.47
11	**47**	4.1	31	24.00		24.80		24.00		**24.27**	0.46	1.90
12	**36**	3.3	31	25.40		26.80		25.80		**26.00**	0.72	2.77
13	**18**	6.5	31	24.80		26.00		27.40		**26.07**	1.30	4.99
14	**40**	5.5	31	27.70		26.80		24.40		**26.30**	1.71	6.50
15	**46**	5.6	31	26.00		27.80		27.50		**27.10**	0.96	3.54
16	**42**	4.1	31	30.20		28.20		25.10		**28.20**	2.57	9.11
17	**23**	3.3	31	32.10	b	28.60		25.50		**28.60**	3.30	11.54
18	**13**	3.3	30	27.50		28.10		32.20	b	**28.80**	2.56	8.89
19	**12**	5.1	31	28.10		31.80		27.60		**28.85**	2.29	7.94
20	**2**	5.2	31	30.40		32.10		28.80		**30.43**	1.65	5.42
21	**41**	4.1	31	34.30		37.50		34.60		**35.45**	1.77	4.99
22	**44**	4.1	31	25.90	b	38.10		35.90		**35.90**	6.50	18.11
23	**31**	3.5	20	27.90	b	39.70		47.30	b	**39.70**	9.78	24.63
24	**43**	4.1	31	44.00		40.00		43.00		**42.50**	2.08	4.89
25	**21**	5.4	31	46.90		41.20	b	45.80		**45.35** *	3.02	6.66
26	**8**	3.91	31	43.50		51.90	b	46.00		**46.00** *	4.31	9.37
27	**8a**	3.31	31	55.90		47.00	b	116.00	b	**55.90** *	37.53	67.14
28	**25**	5.1	31	59.50		60.20		58.30		**59.33** *	0.96	1.62
29	**23a**	6.1	31	39.30	ab	92.90	ab	74.30	a	**74.30** *	27.21	36.62
30	**30**	6.1	30	106.50	ab	91.30	a	75.00	ab	**91.30** *	15.75	17.25
31	**4**	2	40	108.00	a	0.00		0.00		**108.00** *		0.00
32	**26**	3.2	31	199.40	a	202.50	a	208.70	ab	**202.50** *	4.74	2.34
33	**9**	5.1	31	209.40	a	216.90	ab	183.90	ab	**209.40** *	17.30	8.26
34	**4a**	2	41	240.00	ab	230.00	a	160.00	ab	**230.00** *	43.59	18.95
35	**24**	6.5	30	348.00	ab	296.00	ab	320.00	a	**320.00** *	26.03	8.13

Mean	Interlab.std. deviation	
	abs.	rel.%
34.27	**7.07**	**27.31**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**35**
	Percentage of non-tolerable lab means:	**60.0**

Element: Na
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	46	5.6	31	101.20	a	103.10	a	113.00	ab	103.60	*	6.34	6.12
2	23a	6.1	31	95.80	ab	109.70	a	105.70	a	105.70	*	7.16	6.77
3	37	6.1	32	131.00		133.00		130.00		131.33		1.53	1.17
4	22	0	0	140.00		140.00		140.00		140.00		0.00	0.00
5	27	6.1	20	149.00		150.50		148.00		149.17		1.26	0.84
6	38	4.3	31	152.00		151.00		153.00		152.00		1.00	0.66
7	8	3.91	31	155.00		149.00	b	157.00		154.55		4.16	2.69
8	21	5.4	31	153.70		153.00		173.20	b	154.80		11.47	7.41
9	40	5.5	31	153.70		158.50		156.00		156.07		2.40	1.54
10	47	4.1	31	158.00		159.50		160.70		159.40		1.35	0.85
11	14	4.1	20	161.00		169.80	b	148.50	b	161.00		10.70	6.65
12	41	4.1	31	160.00		162.00		167.50		162.45		3.88	2.39
13	7	3.2	31	165.20		164.90		167.20		165.77		1.25	0.75
14	28	5.1	20	168.00		164.00		167.40		166.47		2.16	1.30
15	17	5.4	31	164.60		165.90		169.70		166.70		2.65	1.59
16	45	3.1	31	167.00		167.00		168.00		167.33		0.58	0.35
17	23	3.3	31	156.10	b	170.60		206.20	b	170.60		25.78	15.11
18	42	4.1	31	175.40		174.40		171.40		173.73		2.08	1.20
19	43	4.1	31	174.00		188.00	b	169.00		174.00		9.85	5.66
20	50	4.1	31	178.40		172.80		180.40		177.95		3.94	2.21
21	13	3.3	30	179.70		183.90		179.40		181.00		2.52	1.39
22	2	5.2	31	171.60	b	185.20		199.90	b	185.20		14.15	7.64
23	44	4.1	31	211.50	b	186.90		183.00		186.90		15.45	8.27
24	8a	3.31	31	187.00		257.00	b	181.00	b	187.00		42.25	22.59
25	5	3.3	30	185.50		195.50		190.50		190.50		5.00	2.62
26	39	5.4	31	191.00		193.00		191.00		191.67		1.15	0.60
27	30	6.1	30	197.60		192.60		197.90		196.30		2.98	1.52
28	36	3.3	31	199.00		196.80		198.10		197.97		1.11	0.56
29	12	5.1	31	201.40		190.40	b	207.40	b	201.40		8.62	4.28
30	31	3.5	20	208.30		201.90		202.50		203.65		3.53	1.73
31	24	6.5	30	219.00		230.00	b	224.00		224.00		5.51	2.46
32	25	5.1	31	224.80		214.10	b	254.10	b	224.80		20.71	9.21
33	4	2	40	300.00	ab	282.00	a	253.00	ab	282.00	*	23.71	8.41
34	18	6.5	31	303.80	a	164.20	ab	310.40	ab	303.80	*	82.57	27.18
35	9	5.1	31	325.90	a	328.60	a	351.80	ab	328.70	*	14.24	4.33
36	4a	2	41	340.00	a	360.00	ab	320.00	ab	340.00	*	20.00	5.88
37	26	3.2	31	444.30	a	448.50	a	478.10	ab	448.50	*	18.42	4.11

Mean	Interlab.std. deviation	
	abs.	rel.%
179.40	**10.31**	**4.81**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **37**
Percentage of non-tolerable lab means: **18.9**

Element: Na
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**22**	0	0	50.00		50.00		50.00		**50.00**	*	0.00	0.00
2	**46**	5.6	31	68.80	b	61.20		57.60		**61.20**		5.72	9.35
3	**37**	6.1	32	62.30		61.70		62.10		**62.03**		0.31	0.50
4	**7**	3.2	31	61.30		66.30		62.20		**62.86**		2.67	4.25
5	**47**	4.1	31	67.80		65.70		65.40		**66.30**		1.31	1.98
6	**45**	3.1	31	66.00		66.00		67.00		**66.33**		0.58	0.87
7	**50**	4.1	31	69.10		66.90		70.30		**68.77**		1.72	2.50
8	**14**	4.1	20	70.60		68.30		78.50	b	**70.60**		5.35	7.58
9	**40**	5.5	31	67.90		72.90		71.10		**70.89**		2.53	3.57
10	**38**	4.3	31	70.00		71.00		72.00		**71.00**		1.00	1.41
11	**27**	6.1	20	72.50		69.00		72.00		**71.17**		1.89	2.66
12	**28**	5.1	20	73.00		71.00		74.00		**72.67**		1.53	2.11
13	**5**	3.3	30	70.10	b	75.10		80.10	b	**75.10**		5.00	6.66
14	**42**	4.1	31	79.30		75.30		74.30		**75.91**		2.65	3.49
15	**41**	4.1	31	75.00		78.00		77.80		**76.93**		1.68	2.18
16	**18**	6.5	31	132.20	b	75.40		76.40		**77.01**		32.51	42.22
17	**43**	4.1	31	79.00		78.00		83.00		**79.61**		2.65	3.33
18	**13**	3.3	30	78.90		81.10		79.80		**79.93**		1.11	1.39
19	**31**	3.5	20	76.60		85.70	b	80.60		**80.60**		4.56	5.66
20	**44**	4.1	31	88.70	b	67.30	b	82.80		**82.80**		11.05	13.35
21	**2**	5.2	31	82.40		88.90		84.90		**84.90**		3.28	3.86
22	**23**	3.3	31	75.20	b	87.60		86.80		**86.09**		6.94	8.06
23	**12**	5.1	31	90.70		82.00	b	88.90		**88.69**		4.59	5.18
24	**23a**	6.1	31	77.50	b	91.70		89.40		**89.40**		7.62	8.52
25	**36**	3.3	31	89.90		88.10		90.40		**89.47**		1.21	1.35
26	**25**	5.1	31	102.80		104.60		95.30	b	**102.59**		4.93	4.81
27	**30**	6.1	30	112.30		112.50		123.20	b	**113.51**	*	6.24	5.50
28	**8a**	3.31	31	288.00	b	114.00		106.00	b	**114.00**	*	102.85	90.22
29	**8**	3.91	31	119.00		125.00	b	109.00	b	**119.00**	*	8.08	6.79
30	**21**	5.4	31	133.10	b	128.60		120.20	b	**128.60**	*	6.55	5.09
31	**4**	2	40	142.00	a	120.00	ab	150.00	ab	**142.00**	*	15.53	10.94
32	**17**	5.4	31	150.70	ab	142.10	a	144.00	a	**144.16**	*	4.52	3.14
33	**39**	5.4	31	150.00	a	149.00	a	151.00	a	**150.00**	*	1.00	0.67
34	**24**	6.5	30	180.00	a	174.00	ab	190.00	ab	**180.00**	*	8.08	4.49
35	**9**	5.1	31	241.30	ab	267.30	a	292.60	ab	**267.30**	*	25.65	9.60
36	**4a**	2	41	270.00	a	230.00	ab	270.00	a	**268.89**	*	23.09	8.59
37	**26**	3.2	31	475.50	ab	459.80	a	460.30	a	**461.16**	*	8.92	1.93

Mean	Interlab.std. deviation	
	abs.	rel.%
87.04	**8.78**	**7.94**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**37**
	Percentage of non-tolerable lab means:	**32.4**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**80.69**

Element: Na
Dimension: µg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

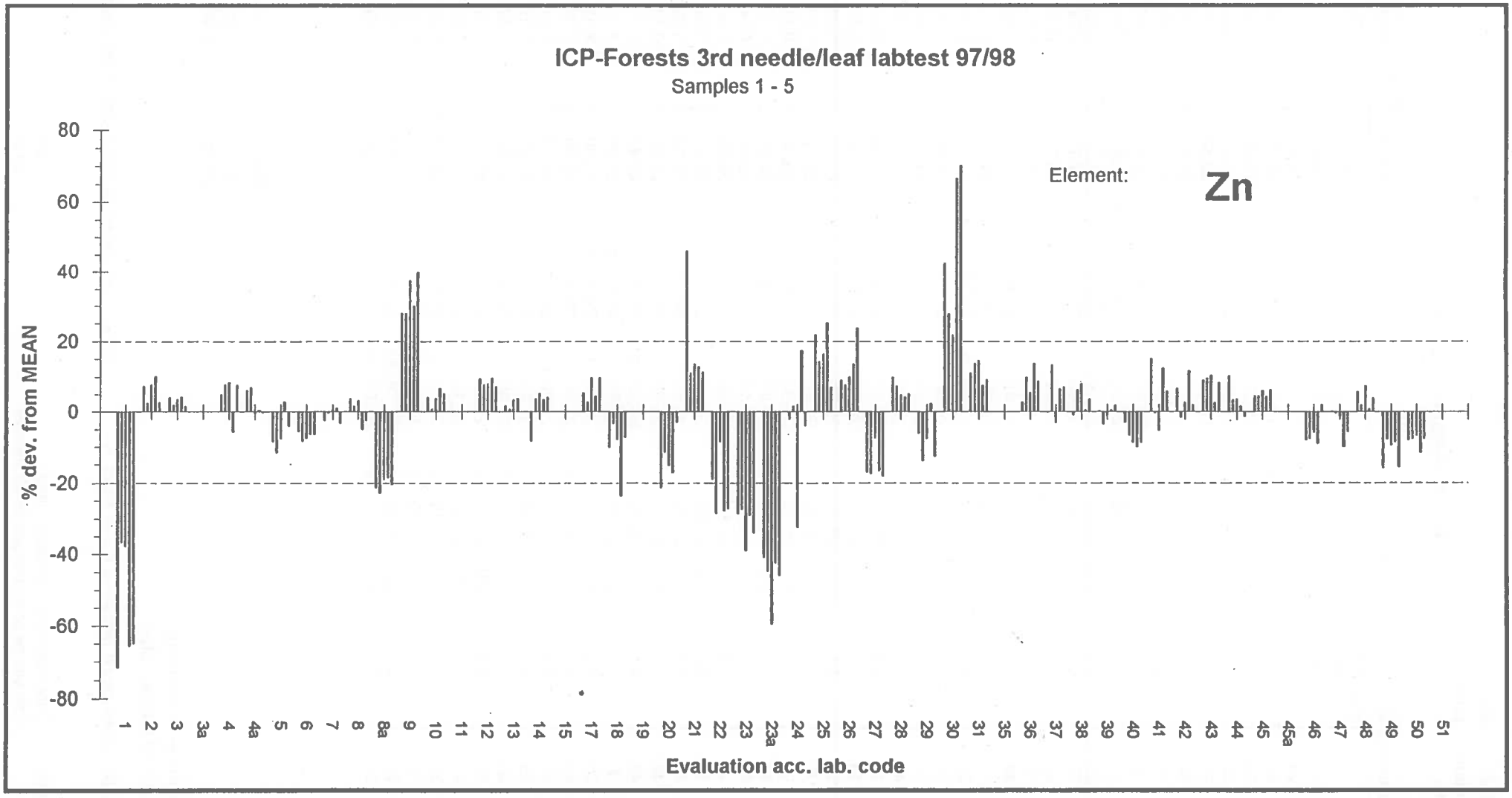
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	22	0	0	0.00		0.00		0.00		0.00	*	0.00	
2	7	3.2	31	9.20		9.70		13.70	b	10.01	*	2.47	24.68
3	28	5.1	20	11.00		11.00		10.00		10.67	*	0.58	5.44
4	46	5.6	31	10.40	b	16.80		22.40	b	16.80	*	6.00	35.71
5	27	6.1	20	16.50		18.50		25.50	b	18.50	*	4.73	25.57
6	47	4.1	31	18.80		18.90		19.00		18.90	*	0.10	0.53
7	37	6.1	32	19.40		19.10		19.10		19.20	*	0.17	0.89
8	50	4.1	31	19.10		19.60		20.50		19.73	*	0.71	3.60
9	5	3.3	30	19.00		21.00		20.50		20.19	*	1.04	5.15
10	45	3.1	31	20.30		20.30		20.30		20.30	*	0.00	0.00
11	17	5.4	31	25.80	b	22.10		22.80		23.01		1.97	8.56
12	18	6.5	31	22.20		23.20		52.40	b	23.26		17.15	73.73
13	14	4.1	20	24.00		23.60		26.30		24.36		1.46	5.99
14	23a	6.1	31	23.90		24.20		26.80		24.61		1.59	6.46
15	42	4.1	31	25.20		25.20		24.20		24.87		0.58	2.33
16	40	5.5	31	26.80		25.40		22.70	b	25.40		2.08	8.19
17	2	5.2	31	25.40		26.00		25.80		25.73		0.31	1.20
18	36	3.3	31	26.20		26.40		25.40		26.00		0.53	2.04
19	13	3.3	30	26.40		27.50		23.90		26.39		1.84	6.97
20	44	4.1	31	29.10		27.20		24.70		27.20		2.21	8.13
21	41	4.1	31	29.20		29.70		31.70		30.01		1.32	4.40
22	31	3.5	20	35.80		31.70	b	48.40	b	35.80		8.70	24.30
23	23	3.3	31	36.20		28.10	b	38.60		36.20		5.50	15.19
24	43	4.1	31	37.00		44.00	b	35.00		37.00		4.73	12.78
25	12	5.1	31	38.80		42.50	b	37.90		38.91		2.44	6.27
26	30	6.1	30	43.10	b	56.70		69.10	b	56.70	*	13.00	22.93
27	21	5.4	31	53.50	b	60.00		82.50	b	60.00	*	15.22	25.37
28	8	3.91	31	56.80	ab	64.60	a	62.40	a	62.40	*	4.02	6.44
29	25	5.1	31	69.70	a	70.90	a	71.20	a	70.60	*	0.79	1.12
30	8a	3.31	31	51.90	ab	85.60	ab	74.00	a	74.00	*	17.12	23.14
31	4a	2	41	160.00	a	150.00	ab	180.00	ab	160.00	*	15.28	9.55
32	9	5.1	31	190.40	ab	198.40	a	196.50	a	196.50	*	4.18	2.13
33	26	3.2	31	359.70	a	366.40	ab	361.90	a	361.90	*	3.42	0.95
34	24	6.5	30	330.00	ab	375.00	a	390.00	ab	375.00	*	31.22	8.33

Mean	Interlab.std. deviation	
	abs.	rel.%
30.55	5.07	11.76

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 34
Percentage of non-tolerable lab means: 55.9


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Zn
% dev. from MEAN
80
60
40
20
0
-20
-40
-60
-80
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
27
28
29
30
31
35
36
37
38
39
40
41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Zn
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	1	3.6	20	6.80	a	6.80	a	7.50	a	**7.02**	*	0.40	5.70
2	23a	6.1	31	14.10	a	15.50	ab	14.60	a	**14.60**	*	0.71	4.86
3	23	3.3	31	18.21	a	17.30	a	17.50	a	**17.62**	*	0.48	2.72
4	8a	3.31	31	20.20	a	19.00	a	19.40	a	**19.42**	*	0.61	3.14
5	20	5.1	20	21.20	ab	19.20	a	19.20	a	**19.42**	*	1.15	5.92
6	22	0	0	20.00		20.00		20.00		**20.00**		0.00	0.00
7	27	6.1	20	18.50	b	20.50		24.50	b	**20.50**		3.06	14.93
8	49	4.1	31	20.80		21.70	b	19.90	b	**20.80**		0.90	4.33
9	18	3.8	31	25.60	b	21.80		22.20		**22.22**		2.09	9.41
10	5	3.3	20	22.60		22.60		22.60		**22.60**		0.00	0.00
11	14	4.1	20	22.70		21.80		23.00		**22.63**		0.62	2.74
12	46	5.6	31	23.10		22.70		22.30		**22.70**		0.40	1.76
13	50	4.1	31	22.80		23.00		22.30		**22.70**		0.36	1.59
14	29	5.1	31	22.90		23.80		23.00		**23.17**		0.49	2.11
15	6	5.6	31	23.30		23.30		23.30		**23.30**		0.00	0.00
16	40	5.5	31	24.00		24.40		22.80	b	**23.98**		0.83	3.46
17	7	3.2	31	23.80		24.00		24.50		**24.10**		0.36	1.49
18	24	6.5	20	24.80		23.20	b	24.20		**24.20**		0.81	3.35
19	38	4.3	31	25.70	b	24.50		23.90		**24.50**		0.92	3.76
20	37	6.1	30	24.20		24.70		25.10		**24.68**		0.45	1.82
21	47	4.1	31	25.00		24.80		24.60		**24.80**		0.20	0.81
22	39	5.4	31	25.60		24.60		24.60		**24.82**		0.58	2.34
23	13	3.3	20	25.20		24.40		25.60		**25.18**		0.61	2.42
24	36	3.3	20	26.00		25.20		25.30		**25.47**		0.44	1.73
25	8	3.91	31	25.70		24.90		26.90	b	**25.70**		1.01	3.93
26	3	3.7	31	26.00		25.00		26.00		**25.78**		0.58	2.25
27	10	6.1	20	25.60		25.80		26.00		**25.80**		0.20	0.78
28	45	3.1	31	25.00		26.10		26.10		**25.88**		0.64	2.47
29	4	2	40	25.50		26.00		27.40	b	**26.00**		0.98	3.77
30	17	5.4	31	25.70		26.10		27.70	b	**26.12**		1.06	4.06
31	48	4.1	31	26.30		26.50		24.30	b	**26.18**		1.22	4.66
32	4a	2	41	26.70		25.50		26.30		**26.28**		0.61	2.32
33	42	4.1	31	26.20		30.20	b	26.20		**26.42**		2.31	8.74
34	2	5.2	31	27.40		26.60		24.90	b	**26.60**		1.28	4.81
35	26	3.2	31	27.00		25.50	b	29.80	b	**27.00**		2.18	8.07
36	43	4.1	31	30.00	b	27.00		26.00	b	**27.00**		2.08	7.70
37	12	5.1	31	27.00		26.80		28.00		**27.12**		0.64	2.36
38	28	5.1	20	28.40	b	27.20		26.10	b	**27.20**		1.15	4.23
39	44	4.1	31	29.70	b	27.30		25.10	b	**27.30**		2.30	8.42
40	31	3.5	20	33.50	b	27.50		27.10		**27.52**		3.59	13.05
41	41	4.1	31	29.40		28.10		28.50		**28.52**		0.67	2.35
42	25	5.1	31	30.10	a	30.60	a	29.80	a	**30.17**	*	0.40	1.33
43	9	5.1	31	31.30	a	31.80	a	31.90	a	**31.67**	*	0.32	1.01
44	30	3.6	20	35.08	a	37.76	ab	35.06	a	**35.29**	*	1.55	4.39
45	21	5.4	31	37.10	ab	33.50	ab	36.20	a	**36.20**	*	1.87	5.17

Mean	Interlab.std. deviation	
	abs.	rel.%
24.75	**0.96**	**3.92**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**20.0**

Element: Zn
Dimension: µg/g
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	23a	6.1	31	23.40	a	8.30	ab	23.40	a	**23.18**	*	8.72	37.62
2	1	3.6	20	26.90	a	25.20	ab	26.70	a	**26.58**	*	0.93	3.50
3	22	0	0	30.00	a	30.00	a	30.00	a	**30.00**	*	0.00	0.00
4	23	3.3	31	26.20	ab	33.90	ab	30.50	a	**30.50**	*	3.86	12.66
5	8a	3.31	31	32.80	a	32.30	a	32.30	a	**32.47**	*	0.29	0.89
6	27	6.1	20	35.50	a	34.50	a	34.50	a	**34.72**		0.58	1.67
7	29	5.1	31	36.90		36.20		35.80		**36.22**		0.56	1.55
8	20	5.1	20	37.50		37.30		36.30	b	**37.18**		0.64	1.72
9	5	3.3	20	37.20		37.20		37.20		**37.20**		0.00	0.00
10	6	5.6	31	39.10		38.10		38.50		**38.52**		0.50	1.30
11	49	4.1	31	38.70		38.20		39.20		**38.70**		0.50	1.29
12	46	5.6	31	39.90	b	37.70	b	38.80		**38.80**		1.10	2.84
13	50	4.1	31	39.20		38.70		38.60		**38.83**		0.32	0.82
14	40	5.5	31	39.30		39.50		37.20	b	**39.18**		1.27	3.24
15	39	5.4	31	40.50		40.50		40.60		**40.53**		0.06	0.15
16	18	3.8	31	41.10		40.60		36.40	b	**40.60**		2.58	6.35
17	42	4.1	31	42.20		41.20		41.20		**41.42**		0.58	1.40
18	7	3.2	31	41.80		42.10		41.80		**41.90**		0.17	0.41
19	41	4.1	31	36.50	b	42.70	b	41.90		**41.90**		3.37	8.04
20	47	4.1	31	41.10	b	43.10	b	41.90		**41.90**		1.01	2.41
21	10	6.1	20	42.30		42.60		42.50		**42.47**		0.15	0.35
22	13	3.3	20	42.40		43.50	b	42.10		**42.47**		0.74	1.74
23	8	3.91	31	42.80		43.60	b	41.60	b	**42.80**		1.01	2.36
24	24	6.5	20	42.80		43.30		40.10	b	**42.80**		1.72	4.02
25	48	4.1	31	43.40		42.40		43.00		**42.98**		0.50	1.16
26	3	3.7	31	43.00		43.00		43.00		**43.00**		0.00	0.00
27	2	5.2	31	43.40		39.40	b	43.50		**43.23**		2.34	5.41
28	17	5.4	31	42.90		45.20	b	43.30		**43.32**		1.23	2.84
29	44	4.1	31	46.80	b	41.00	b	43.60		**43.60**		2.91	6.67
30	14	4.1	20	43.70		43.30		44.30		**43.72**		0.50	1.14
31	45	3.1	31	44.20		43.80		44.20		**44.07**		0.23	0.52
32	38	4.3	31	45.20		44.80		43.00	b	**44.78**		1.17	2.61
33	4a	2	41	44.80		45.90	b	44.90		**45.07**		0.61	1.35
34	28	5.1	20	45.40		45.00		45.30		**45.23**		0.21	0.46
35	12	5.1	31	45.50		44.80		45.70		**45.38**		0.47	1.04
36	26	3.2	31	45.40		44.00	b	49.70	b	**45.40**		2.97	6.54
37	4	2	40	45.40		46.40	b	45.00		**45.42**		0.72	1.59
38	43	4.1	31	46.00		51.00	b	46.00		**46.22**		2.89	6.25
39	36	3.3	20	46.50		46.60		45.00	b	**46.33**		0.90	1.94
40	21	5.4	31	46.80		45.70	b	48.50	b	**46.80**		1.41	3.01
41	37	6.1	30	48.10		47.50		47.70		**47.77**		0.31	0.65
42	31	3.5	20	47.70		47.70		48.70		**47.92**		0.58	1.21
43	25	5.1	31	48.60		48.20		47.50		**48.18**		0.56	1.16
44	30	3.6	20	53.40	a	53.83	a	55.86	ab	**53.84**	*	1.31	2.43
45	9	5.1	31	53.50	a	55.30	ab	53.90	a	**53.92**	*	0.95	1.76

Mean	Interlab.std. deviation	
	abs.	rel.%
42.12	**1.19**	**3.25**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**15.6**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Zn
Dimension: µg/g
Sample: 3 **SPRUCE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	23a	6.1	31	17.60	a	18.20	a	17.40	a	**17.73**	*	0.42	2.37
2	23	3.3	31	26.30	a	26.20	a	28.30	ab	**26.69**	*	1.18	4.42
3	1	3.6	20	24.30	ab	29.40	ab	27.20	a	**27.20**	*	2.56	9.41
4	24	6.5	20	29.60	a	30.40	a	28.30	a	**29.56**	*	1.06	3.59
5	8a	3.31	31	34.90	a	35.40	a	35.90	a	**35.40**		0.50	1.41
6	20	5.1	20	37.70		36.40		37.30		**37.13**		0.67	1.80
7	49	4.1	31	39.60		40.30		38.90		**39.60**		0.70	1.77
8	40	5.5	31	40.80		39.90		39.10		**39.93**		0.85	2.13
9	22	0	0	40.00		40.00		40.00		**40.00**		0.00	0.00
10	18	3.8	31	37.30	b	41.40		40.30		**40.30**		2.12	5.26
11	5	3.3	20	40.60		40.60		40.10		**40.43**		0.29	0.72
12	29	5.1	31	39.80		41.50		40.20		**40.44**		0.89	2.20
13	6	5.6	31	40.30		40.60		40.50		**40.47**		0.15	0.37
14	27	6.1	20	35.00	b	45.00	b	40.50		**40.50**		5.01	12.37
15	50	4.1	31	41.80		40.60		40.10		**40.79**		0.87	2.13
16	46	5.6	31	41.20		39.10	b	42.80	b	**41.20**		1.86	4.51
17	41	4.1	31	38.50	b	41.50		47.30	b	**41.50**		4.47	10.77
18	37	6.1	30	41.80		42.90		42.50		**42.40**		0.56	1.32
19	47	4.1	31	42.10		43.30		44.00		**43.21**		0.96	2.22
20	39	5.4	31	44.10		43.00		43.00		**43.37**		0.64	1.48
21	4a	2	41	43.30		44.20		43.40		**43.63**		0.49	1.12
22	7	3.2	31	44.40		44.20		43.80		**44.13**		0.31	0.70
23	42	4.1	31	45.40		45.40		44.40		**45.07**		0.58	1.29
24	8	3.91	31	44.60		45.20		46.00		**45.27**		0.70	1.55
25	13	3.3	20	43.10	b	48.00	b	45.40		**45.40**		2.45	5.40
26	3	3.7	31	45.00		47.00	b	45.00		**45.44**		1.15	2.53
27	44	4.1	31	49.20	b	44.80		45.20		**45.44**		2.43	5.35
28	10	6.1	20	46.80		45.50		44.80		**45.59**		1.01	2.22
29	28	5.1	20	46.00		48.00	b	44.40	b	**46.00**		1.80	3.91
30	14	4.1	20	46.60		46.70		44.90	b	**46.21**		1.01	2.19
31	36	3.3	20	47.20		46.40		44.80	b	**46.36**		1.22	2.63
32	45	3.1	31	47.30		46.10		46.10		**46.50**		0.69	1.48
33	48	4.1	31	47.10		51.10	b	45.10	b	**47.10**		3.06	6.50
34	2	5.2	31	37.10	b	47.30		51.00	b	**47.30**		7.20	15.22
35	12	5.1	31	49.20	b	46.20		47.40		**47.40**		1.51	3.19
36	38	4.3	31	47.60		47.90		46.80		**47.43**		0.57	1.20
37	4	2	40	46.40		48.00		48.00		**47.56**		0.92	1.93
38	17	5.4	31	48.60		47.50		48.40		**48.17**		0.59	1.22
39	26	3.2	31	47.50		48.20		51.40	b	**48.29**		2.08	4.31
40	43	4.1	31	48.00		50.00	b	48.00		**48.44**		1.15	2.37
41	21	5.4	31	50.10		50.50		47.70	b	**49.86**		1.51	3.03
42	31	3.5	20	50.20		49.90		50.70		**50.27**		0.40	0.80
43	25	5.1	31	51.10		50.90		51.20		**51.07**		0.15	0.29
44	30	3.6	20	53.46	a	50.55	ab	58.58	ab	**53.46**	*	4.07	7.61
45	9	5.1	31	60.30	a	62.90	ab	59.10	a	**60.30**	*	1.94	3.22

Mean	Interlab.std. deviation	
	abs.	rel.%
43.86	**1.44**	**3.37**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**13.3**

Element: Zn
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	1	3.6	20	8.40	ab	12.00	ab	9.60	a	9.60 *	1.83	19.06
2	23a	6.1	31	16.80	a	15.70	a	16.10	a	16.12 *	0.56	3.47
3	23	3.3	31	17.70	ab	29.50	ab	19.80	a	19.80 *	6.29	31.77
4	22	0	0	20.00	a	40.00	ab	20.00	a	20.22 *	11.55	57.12
5	18	3.8	31	28.50	ab	20.80	a	21.40	a	21.40 *	4.28	20.00
6	8a	3.31	31	24.60	b	22.50		22.60		22.77	1.18	5.18
7	20	5.1	20	23.20		26.90	b	22.40		23.20	2.40	10.34
8	27	6.1	20	23.00		23.50		23.50		23.33	0.29	1.24
9	50	4.1	31	24.40		24.70		26.40	b	24.77	1.08	4.36
10	40	5.5	31	24.60		26.70	b	25.20		25.20	1.08	4.29
11	47	4.1	31	24.80		25.20		25.80		25.22	0.50	1.98
12	46	5.6	31	25.90		25.50		25.00		25.48	0.45	1.77
13	49	4.1	31	25.60		25.20		25.90		25.57	0.35	1.37
14	6	5.6	31	28.00	b	24.70	b	26.20		26.20	1.65	6.30
15	4	2	40	26.90		26.30		26.00		26.37	0.46	1.74
16	8	3.91	31	26.60		26.00		31.10	b	26.60	2.79	10.49
17	4a	2	41	28.00		28.30		28.10		28.13	0.15	0.53
18	38	4.3	31	28.20		30.90	b	27.20	b	28.20	1.91	6.77
19	39	5.4	31	27.40		28.20		29.10		28.20	0.85	3.01
20	48	4.1	31	29.70	b	27.90		28.20		28.27	0.96	3.40
21	7	3.2	31	28.10		37.70	b	28.10		28.32	5.54	19.56
22	44	4.1	31	28.80		26.10	b	28.60		28.48	1.50	5.27
23	29	5.1	31	28.50		30.00	b	28.50		28.72	0.87	3.03
24	43	4.1	31	28.00		29.00		29.00		28.78	0.58	2.02
25	5	3.3	20	28.60		30.60	b	28.60		28.82	1.15	3.99
26	14	4.1	20	28.80		28.80		30.10	b	29.02	0.75	2.58
27	13	3.3	20	29.80		28.80		29.00		29.12	0.53	1.82
28	3	3.7	31	29.00		30.00		29.00		29.22	0.58	1.98
29	28	5.1	20	30.00		29.00		29.00		29.22	0.58	1.98
30	45	3.1	31	28.40		29.50		29.50		29.28	0.64	2.19
31	17	5.4	31	29.30		30.50	b	28.90		29.32	0.83	2.83
32	37	6.1	30	30.20		29.60		29.80		29.87	0.31	1.04
33	10	6.1	20	29.60		30.10		30.10		29.93	0.29	0.97
34	31	3.5	20	30.30		30.10		30.10		30.17	0.12	0.40
35	12	5.1	31	31.10		30.60		30.50		30.73	0.32	1.04
36	2	5.2	31	30.20		31.20		31.00		30.88	0.53	1.72
37	42	4.1	31	31.10		32.10		31.10		31.32	0.58	1.85
38	41	4.1	31	35.70	b	31.10		31.50		31.52	2.55	8.09
39	21	5.4	31	29.20	b	31.80		31.90		31.63	1.53	4.84
40	26	3.2	31	31.50		32.50		31.80		31.87	0.51	1.60
41	36	3.3	20	30.20	b	34.90	b	31.90		31.90	2.38	7.46
42	24	6.5	20	34.80	b	32.70		32.70		32.92	1.21	3.68
43	25	5.1	31	35.20	a	35.20	a	34.90	a	35.10 *	0.17	0.48
44	9	5.1	31	36.50	a	33.40	ab	37.30	a	36.50 *	2.06	5.64
45	30	3.6	20	47.70	ab	43.09	ab	46.71	a	46.71 *	2.43	5.20

Mean	Interlab.std. deviation	
	abs.	rel.%
28.04	1.54	6.34

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	17.8
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	28.68

Element: Zn
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

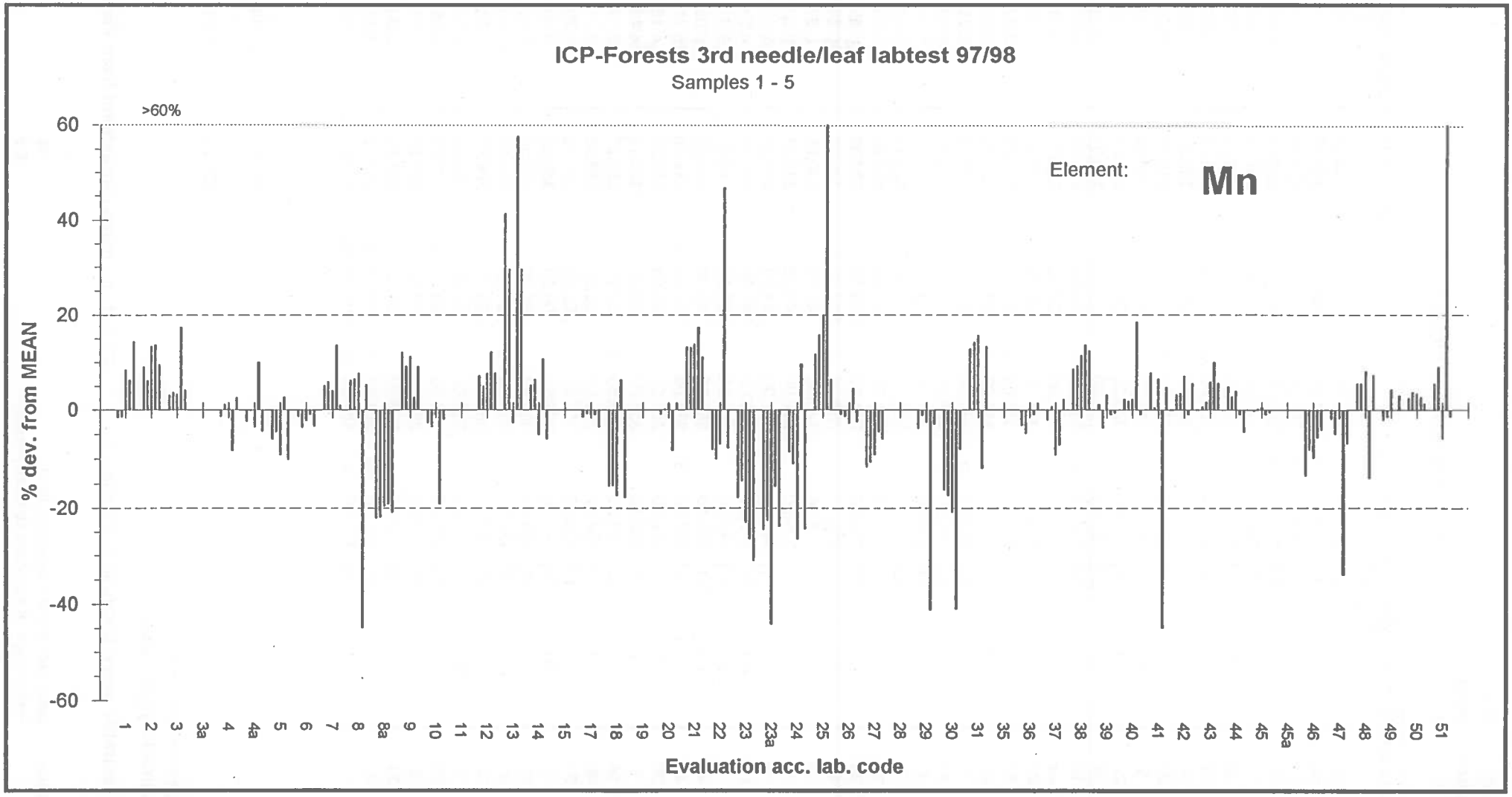
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	1	3.6	20	8.40	ab	9.60	a	11.70	ab	9.60	*	1.67	17.40
2	23a	6.1	31	14.00	ab	14.90	a	15.00	a	14.84	*	0.55	3.71
3	23	3.3	31	18.10	a	16.30	ab	19.00	ab	18.10	*	1.37	7.57
4	22	0	0	20.00	a	20.00	a	20.00	a	20.00	*	0.00	0.00
5	8a	3.31	31	21.80	a	22.00	a	21.80	a	21.87	*	0.12	0.55
6	27	6.1	20	22.00	a	22.50	a	25.00	ab	22.50		1.61	7.16
7	49	4.1	31	22.00	ab	23.20	a	24.00	ab	23.20		1.01	4.35
8	29	5.1	31	23.90		24.20		24.00		24.03		0.15	0.62
9	40	5.5	31	25.50		23.80	b	25.10		25.10		0.89	3.55
10	50	4.1	31	25.60		25.40		24.80		25.39		0.42	1.65
11	18	3.8	31	25.50		26.00		23.70	b	25.50		1.21	4.75
12	6	5.6	31	25.70		25.70		25.70		25.70		0.00	0.00
13	47	4.1	31	25.90		26.10		25.80		25.93		0.15	0.58
14	5	3.3	20	26.50		26.50		25.00	b	26.39		0.87	3.30
15	24	6.5	20	26.80		26.40		25.00	b	26.40		0.95	3.60
16	7	3.2	31	26.40		26.60		26.90		26.61		0.25	0.94
17	20	5.1	20	28.50	b	26.50		26.60		26.66		1.13	4.24
18	8	3.91	31	26.70		27.50		26.70		26.81		0.46	1.72
19	44	4.1	31	27.10		29.80	b	25.40	b	27.10		2.22	8.19
20	4a	2	41	27.50		27.60		25.70	b	27.44		1.07	3.90
21	13	3.3	20	27.40		27.40		28.20		27.51		0.46	1.67
22	3	3.7	31	29.00	b	27.00	b	28.00		28.00		1.00	3.57
23	39	5.4	31	28.10		28.20		27.90		28.07		0.15	0.53
24	42	4.1	31	28.20		28.20		27.20	b	28.09		0.58	2.06
25	46	5.6	31	25.10	b	28.10		29.90	b	28.10		2.42	8.61
26	2	5.2	31	28.00		28.30		29.00		28.30		0.51	1.80
27	38	4.3	31	28.70		28.40		28.50		28.53		0.15	0.53
28	48	4.1	31	28.70		28.80		27.90		28.64		0.49	1.71
29	14	4.1	20	28.70		28.30		29.10		28.70		0.40	1.39
30	10	6.1	20	31.60	b	29.00		28.60		29.00		1.63	5.62
31	28	5.1	20	28.00	b	29.00		31.00	b	29.00		1.53	5.28
32	41	4.1	31	29.10		31.20	b	29.00		29.16		1.24	4.25
33	45	3.1	31	29.40		29.40		28.30	b	29.29		0.64	2.19
34	25	5.1	31	30.10		29.50		20.30	b	29.50		5.49	18.61
35	37	6.1	30	29.50		29.00		29.80		29.50		0.40	1.36
36	12	5.1	31	29.40		29.50		30.90	b	29.56		0.84	2.84
37	4	2	40	28.60	b	29.70		29.80		29.64		0.67	2.26
38	43	4.1	31	30.00		30.00		28.00	b	29.89		1.15	3.85
39	36	3.3	20	30.00		28.80	b	30.30		30.00		0.79	2.63
40	31	3.5	20	30.10		29.80		33.20	b	30.10		1.88	6.25
41	17	5.4	31	30.30		29.30	b	30.40		30.24		0.61	2.02
42	21	5.4	31	28.70	b	30.70		32.80	b	30.70		2.05	6.68
43	26	3.2	31	37.70	ab	34.00	a	33.90	a	34.06	*	2.17	6.37
44	9	5.1	31	38.60	a	35.50	ab	38.70	a	38.54	*	1.82	4.72
45	30	3.6	20	46.88	a	48.48	ab	45.24	ab	46.88	*	1.62	3.46

Mean	Interlab.std. deviation	
	abs.	rel.%
27.54	1.04	3.96

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 45
Percentage of non-tolerable lab means: 17.8


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>60%
Element:
Mn
% dev. from MEAN
60
40
20
0
-20
-40
-60
1
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Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Mn
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	23a	6.1	31	253.00	a	260.00	ab	251.00	a	254.22	*	4.73	1.86
2	8a	3.31	31	263.00	a	261.00	a	263.00	a	262.33	*	1.15	0.44
3	23	3.3	31	249.00	ab	282.00	a	277.00	a	277.00		17.79	6.42
4	30	3.6	20	273.30	ab	286.20	a	282.40	a	282.08		6.63	2.35
5	18	3.8	31	286.00	a	275.00	ab	288.00	a	284.78		7.00	2.46
6	46	5.6	31	286.20	ab	294.30	a	294.30	a	292.08		4.68	1.60
7	27	6.1	20	298.00		309.50	b	291.00	b	298.00		9.34	3.13
8	24	6.5	20	321.00	b	306.00		306.00		308.22		8.66	2.81
9	22	0	0	320.00	b	300.00	b	310.00		310.00		10.00	3.23
10	5	3.3	20	317.00		317.00		317.00		317.00		0.00	0.00
11	29	5.1	31	323.00		325.00		325.00		324.33		1.15	0.35
12	36	3.3	20	323.00		330.00		326.00		326.33		3.51	1.08
13	10	6.1	20	318.00	b	334.00	b	328.00		328.00		8.08	2.46
14	4a	2	41	330.90		331.80		324.80		329.17		3.81	1.16
15	49	4.1	31	330.00		331.00		329.00		330.00		1.00	0.30
16	37	6.1	30	330.00		337.00	b	326.00		330.22		5.57	1.69
17	47	4.1	31	335.00		331.00		327.00		331.00		4.00	1.21
18	1	3.6	20	323.00	b	334.00		334.00		331.78		6.35	1.91
19	17	5.4	31	347.00	b	328.00		332.00		332.22		10.02	3.02
20	6	5.6	31	334.00		331.00		333.00		332.67		1.53	0.46
21	4	2	40	329.00		335.70		333.50		332.73		3.42	1.03
22	26	3.2	31	340.00	b	324.00	b	334.00		334.00		8.08	2.42
23	20	5.1	20	336.00		334.00		333.00		334.33		1.53	0.46
24	45	3.1	31	336.00		336.00		337.00		336.33		0.58	0.17
25	43	4.1	31	340.00		340.00		340.00		340.00		0.00	0.00
26	39	5.4	31	339.00		342.00		344.00		341.67		2.52	0.74
27	40	5.5	31	349.20		345.20		341.30		345.23		3.95	1.14
28	50	4.1	31	347.00		350.00		341.00		346.28		4.58	1.32
29	3	3.7	31	349.00		344.00		351.00		348.00		3.61	1.04
30	42	4.1	31	346.00		350.00		349.00		348.33		2.08	0.60
31	44	4.1	31	387.00	b	354.00		335.00	b	354.00		26.31	7.43
32	28	5.1	20	359.00		351.00		353.00		354.22		4.16	1.17
33	7	3.2	31	350.00		356.00		358.00		354.78		4.16	1.17
34	14	4.1	20	353.20		363.60	b	352.90		355.27		6.09	1.71
35	48	4.1	31	354.00		360.00		355.00		356.33		3.21	0.90
36	51	2	41	359.00		352.00		358.00		356.33		3.79	1.06
37	8	3.91	31	362.00		358.00		356.00		358.67		3.06	0.85
38	12	5.1	31	353.40	b	362.10		366.80		362.10		6.80	1.88
39	41	4.1	31	430.00	b	338.00	b	364.00		364.00		47.43	13.03
40	38	4.3	31	367.00		365.00		368.00		366.67		1.53	0.42
41	2	5.2	31	375.00	b	368.00		362.00	b	368.00		6.51	1.77
42	25	5.1	31	374.00		376.00		385.00	b	377.22		5.86	1.55
43	9	5.1	31	379.00		382.00		375.00		378.67		3.51	0.93
44	31	3.5	20	379.00		383.00		381.00		381.00		2.00	0.52
45	21	5.4	31	391.00	ab	381.00	a	379.00	a	382.22		6.43	1.68
46	13	3.3	20	477.00	a	486.00	ab	467.00	ab	477.00	*	9.50	1.99

Mean	Interlab.std. deviation	
	abs.	rel.%
338.20	**6.21**	**1.85**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:	Data sets >0 or >detection limit:	**46**
	Percentage of non-tolerable lab means:	**6.5**

Element: Mn
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	256.00	ab	249.00	a	246.00	a	**249.50 ***	5.13	2.06
2	8a	3.31	31	253.00	a	251.00	a	251.00	a	**251.67 ***	1.15	0.46
3	30	3.6	20	266.00	a	252.90	ab	273.30	ab	**266.00**	10.34	3.89
4	18	3.8	31	270.00	a	275.00	a	273.00	a	**272.67**	2.52	0.92
5	23	3.3	31	275.00	a	276.00	a	276.00	a	**275.67**	0.58	0.21
6	24	6.5	20	317.00	b	285.00		285.00		**287.00**	18.48	6.44
7	27	6.1	20	291.50		286.50		285.50		**287.83**	3.21	1.12
8	22	0	0	300.00	b	280.00	b	290.00		**290.00**	10.00	3.45
9	46	5.6	31	295.90		285.70	b	300.10		**295.90**	7.41	2.50
10	36	3.3	20	301.00	b	309.00		308.00		**306.50**	4.36	1.42
11	47	4.1	31	306.00		311.00		303.00		**306.50**	4.04	1.32
12	5	3.3	20	306.00		311.00		306.00		**307.67**	2.89	0.94
13	39	5.4	31	308.00		311.00		312.00		**310.33**	2.08	0.67
14	6	5.6	31	313.00		308.00		311.00		**310.67**	2.52	0.81
15	10	6.1	20	306.00		315.00		311.00		**311.00**	4.51	1.45
16	49	4.1	31	318.00		319.00		316.00		**317.67**	1.53	0.48
17	1	3.6	20	316.00		322.00		316.00		**318.00**	3.46	1.09
18	26	3.2	31	318.00		326.00	b	311.00	b	**318.00**	7.51	2.36
19	29	5.1	31	319.00		322.00		315.00		**318.67**	3.51	1.10
20	17	5.4	31	315.00		331.00	b	320.00		**320.00**	8.19	2.56
21	4a	2	41	323.00		325.00		318.00		**322.00**	3.61	1.12
22	20	5.1	20	324.00		324.00		322.00		**323.33**	1.15	0.36
23	45	3.1	31	327.00		321.00		322.00		**323.33**	3.21	0.99
24	41	4.1	31	323.00		323.00		327.00		**324.33**	2.31	0.71
25	37	6.1	30	318.00	b	330.00		325.00		**325.00**	6.03	1.86
26	4	2	40	327.30		328.90		323.80		**326.67**	2.61	0.80
27	43	4.1	31	320.00	b	330.00		330.00		**328.00**	5.77	1.76
28	40	5.5	31	329.00		335.40	b	325.10		**329.05**	5.20	1.58
29	44	4.1	31	348.00	b	304.00	b	332.00		**332.00**	22.27	6.71
30	42	4.1	31	334.00		334.00		335.00		**334.33**	0.58	0.17
31	3	3.7	31	337.00		331.00		336.00		**334.67**	3.21	0.96
32	50	4.1	31	338.00		336.00		331.00		**335.00**	3.61	1.08
33	12	5.1	31	339.00		327.50	b	343.50		**339.00**	8.25	2.43
34	48	4.1	31	343.00		342.00		337.00		**340.67**	3.21	0.94
35	7	3.2	31	342.00		347.00		338.00		**342.00**	4.51	1.32
36	2	5.2	31	343.00		339.00		349.00	b	**343.00**	5.03	1.47
37	14	4.1	20	343.60		340.00		353.30	b	**343.80**	6.88	2.00
38	8	3.91	31	344.00		350.00	b	339.00		**344.00**	5.51	1.60
39	28	5.1	20	349.00		363.00	b	351.00		**352.00**	7.57	2.15
40	51	2	41	355.00		352.00		349.00		**352.00**	3.00	0.85
41	9	5.1	31	352.00		352.00		354.00		**352.67**	1.15	0.33
42	38	4.3	31	352.00		363.00	b	350.00		**353.00**	7.00	1.98
43	21	5.4	31	366.00	a	356.00	ab	368.00	a	**365.00**	6.43	1.76
44	31	3.5	20	369.00	a	369.00	a	368.00	a	**368.67**	0.58	0.16
45	25	5.1	31	380.00	ab	374.00	a	361.00	ab	**374.00**	9.71	2.60
46	13	3.3	20	432.00	ab	416.00	a	417.00	a	**418.50 ***	8.96	2.14

Mean	Interlab.std. deviation	
	abs.	rel.%
323.40	**5.23**	**1.63**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	46
	Percentage of non-tolerable lab means:	6.5

Element: Mn
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	750.00	a	691.00	ab	811.00	ab	750.00 *	60.00	8.00
2	24	6.5	20	999.98	a	940.00	ab	987.00	a	987.00 *	31.56	3.20
3	23	3.3	31	900.00	ab	1116.00	ab	1034.00	a	1034.00 *	109.04	10.55
4	30	3.6	20	1047.00	a	1062.00	a	1080.00	a	1062.00 *	16.52	1.56
5	8a	3.31	31	1080.00	a	1080.00	a	1080.00	a	1080.00	0.00	0.00
6	18	3.8	31	1092.00	a	1110.00	a	1137.00	ab	1110.00	22.65	2.04
7	46	5.6	31	1212.00		1193.00		1253.00	b	1212.00	30.66	2.53
8	27	6.1	20	1100.00	b	1225.00		1225.00		1219.44	72.17	5.92
9	5	3.3	20	1228.00		1223.00		1203.00		1219.94	13.23	1.08
10	37	6.1	30	1190.00	b	1240.00	b	1220.00		1220.00	25.17	2.06
11	22	0	0	1270.00	b	1250.00		1230.00	b	1250.00	20.00	1.60
12	51	2	41	1270.00		1267.00		1261.00		1266.00	4.58	0.36
13	14	4.1	20	1274.80		1272.70		1277.80		1275.10	2.56	0.20
14	4a	2	41	1299.00		1306.00		1268.00	b	1296.94	20.22	1.56
15	26	3.2	31	1283.00	b	1349.00	b	1306.00		1306.00	33.50	2.57
16	13	3.3	20	1308.00		1331.00	b	1155.00	b	1308.00	95.67	7.31
17	29	5.1	31	1310.00		1304.00		1312.00		1308.67	4.16	0.32
18	6	5.6	31	1296.00		1323.00		1315.00		1313.44	13.87	1.06
19	47	4.1	31	1321.00		1311.00		1328.00		1320.00	8.54	0.65
20	10	6.1	20	1339.00		1331.00		1296.00	b	1329.44	22.87	1.72
21	17	5.4	31	1320.00		1329.00		1370.00	b	1330.06	26.65	2.00
22	36	3.3	20	1354.00		1355.00		1325.00	b	1348.94	17.04	1.26
23	4	2	40	1350.00		1356.00		1345.00		1350.33	5.51	0.41
24	45	3.1	31	1355.00		1349.00		1351.00		1351.67	3.06	0.23
25	20	5.1	20	1273.00	b	1363.00		1398.00	b	1363.00	64.49	4.73
26	40	5.5	31	1346.00	b	1377.00		1393.00		1377.00	23.90	1.74
27	39	5.4	31	1385.00		1391.00		1388.00		1388.00	3.00	0.22
28	3	3.7	31	1384.00		1395.00		1393.00		1390.67	5.86	0.42
29	50	4.1	31	1407.00		1384.00		1390.00		1392.56	11.93	0.86
30	44	4.1	31	1480.00	b	1346.00	b	1400.00		1400.00	67.42	4.82
31	7	3.2	31	1397.00		1402.00		1403.00		1400.67	3.21	0.23
32	49	4.1	31	1404.00		1396.00		1412.00		1404.00	8.00	0.57
33	43	4.1	31	1420.00		1440.00		1420.00		1425.56	11.55	0.81
34	28	5.1	20	1426.00		1453.00	b	1414.00		1426.00	19.97	1.40
35	41	4.1	31	1446.00		1425.00		1430.00		1433.06	10.97	0.77
36	42	4.1	31	1431.00		1441.00		1451.00		1441.00	10.00	0.69
37	12	5.1	31	1449.00		1437.00		1463.00		1449.00	13.01	0.90
38	8	3.91	31	1450.00		1460.00		1440.00		1450.00	10.00	0.69
39	48	4.1	31	1438.00		1461.00		1459.00		1454.44	12.74	0.88
40	1	3.6	20	1453.00		1453.00		1494.00	b	1458.56	23.67	1.62
41	9	5.1	31	1477.00	b	1506.00		1499.00		1496.94	15.13	1.01
42	38	4.3	31	1480.00		1500.00		1510.00		1499.44	15.28	1.02
43	2	5.2	31	1367.00	b	1525.00		1592.00	b	1525.00	115.53	7.58
44	21	5.4	31	1536.00		1540.00		1518.00		1532.44	11.72	0.76
45	31	3.5	20	1556.00	a	1558.00	a	1556.00	a	1556.67	1.15	0.07
46	25	5.1	31	1593.00	a	1612.00	a	1630.00	a	1612.00	18.50	1.15

Mean	Interlab.std. deviation	
	abs.	rel.%
1347.00	**24.70**	**1.98**

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	46
	Percentage of non-tolerable lab means:	8.7

Element: Mn
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	8	3.91	31	15.00	a	15.00	a	14.00	ab	15.00	*	0.58	3.87
2	41	4.1	31	16.00	ab	15.00	a	15.00	a	15.00	*	0.58	3.87
3	29	5.1	31	17.00	ab	15.00	ab	16.00	a	16.00	*	1.00	6.25
4	30	3.6	20	18.55	ab	16.06	a	16.00	ab	16.06	*	1.46	9.09
5	47	4.1	31	18.00	a	18.00	a	17.00	ab	18.00	*	0.58	3.22
6	23	3.3	31	20.00	a	39.00	ab	18.00	ab	20.00	*	11.59	57.95
7	8a	3.31	31	23.00	b	22.00		22.00		22.00		0.58	2.64
8	10	6.1	20	19.00	b	24.00	b	22.00		22.00		2.52	11.45
9	23a	6.1	31	25.00	b	23.00		23.00		23.00		1.15	5.00
10	48	4.1	31	23.50		22.30	b	23.80	b	23.50		0.79	3.36
11	31	3.5	20	28.00	b	24.00		23.00	b	24.00		2.65	11.04
12	4	2	40	24.90	b	26.50	b	25.00		25.00		0.90	3.60
13	20	5.1	20	25.00		24.00	b	25.00		25.00		0.58	2.32
14	37	6.1	30	24.90	b	25.40	b	25.30		25.30		0.26	1.03
15	46	5.6	31	25.60	b	26.74	b	25.70		25.70		0.63	2.45
16	27	6.1	20	26.50	b	25.50	b	26.00		26.00		0.50	1.92
17	6	5.6	31	27.00		27.00		27.00		27.00		0.00	0.00
18	17	5.4	31	27.00		27.00		27.00		27.00		0.00	0.00
19	36	3.3	20	27.00		27.00		28.00	b	27.00		0.58	2.15
20	39	5.4	31	28.00	b	27.00		27.00		27.00		0.58	2.15
21	42	4.1	31	29.00	b	27.00		27.00		27.00		1.15	4.26
22	44	4.1	31	27.00		27.00		30.00	b	27.00		1.73	6.41
23	45	3.1	31	28.00	b	27.00		27.00		27.00		0.58	2.15
24	5	3.3	20	28.00		28.00		28.00		28.00		0.00	0.00
25	9	5.1	31	28.00		28.00		28.00		28.00		0.00	0.00
26	50	4.1	31	29.00	b	28.00		28.00		28.00		0.58	2.07
27	26	3.2	31	28.50		28.70	b	27.50	b	28.50		0.64	2.25
28	1	3.6	20	31.00	b	29.00		27.00	b	29.00		2.00	6.90
29	18	3.8	31	40.00	b	29.00		25.00	b	29.00		7.77	26.79
30	28	5.1	20	29.00		30.00	b	28.00	b	29.00		1.00	3.45
31	24	6.5	20	30.00	b	29.90		28.99	b	29.90		0.56	1.87
32	4a	2	41	30.00		29.60	b	30.80	b	30.00		0.61	2.03
33	43	4.1	31	30.00		30.00		30.00		30.00		0.00	0.00
34	14	4.1	20	30.20		30.30	b	29.50	b	30.20		0.44	1.46
35	12	5.1	31	29.80	b	30.60		30.70	b	30.60		0.49	1.60
36	2	5.2	31	33.00	b	31.00		31.00		31.00		1.15	3.71
37	7	3.2	31	33.00	b	31.00		30.00	b	31.00		1.53	4.94
38	38	4.3	31	32.00	b	31.00		31.00		31.00		0.58	1.87
39	3	3.7	31	32.00		29.00	b	32.00		32.00		1.73	5.41
40	21	5.4	31	33.00	b	32.00		32.00		32.00		0.58	1.81
41	40	5.5	31	32.30		31.30	b	35.40	b	32.30		2.14	6.63
42	22	0	0	40.00	a	40.00	a	40.00	a	40.00	*	0.00	0.00
43	13	3.3	20	43.00	a	43.00	a	41.00	ab	43.00	*	1.15	2.67
44	51	2	41	63.30	ab	65.50	ab	63.90	a	63.90	*	1.14	1.78
45	25	5.1	31	76.10	ab	74.80	a	72.10	ab	74.80	*	2.04	2.73

Mean	Interlab.std. deviation	
	abs.	rel.%
27.33	1.27	5.03

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	22.2
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	27.51

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Mn
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

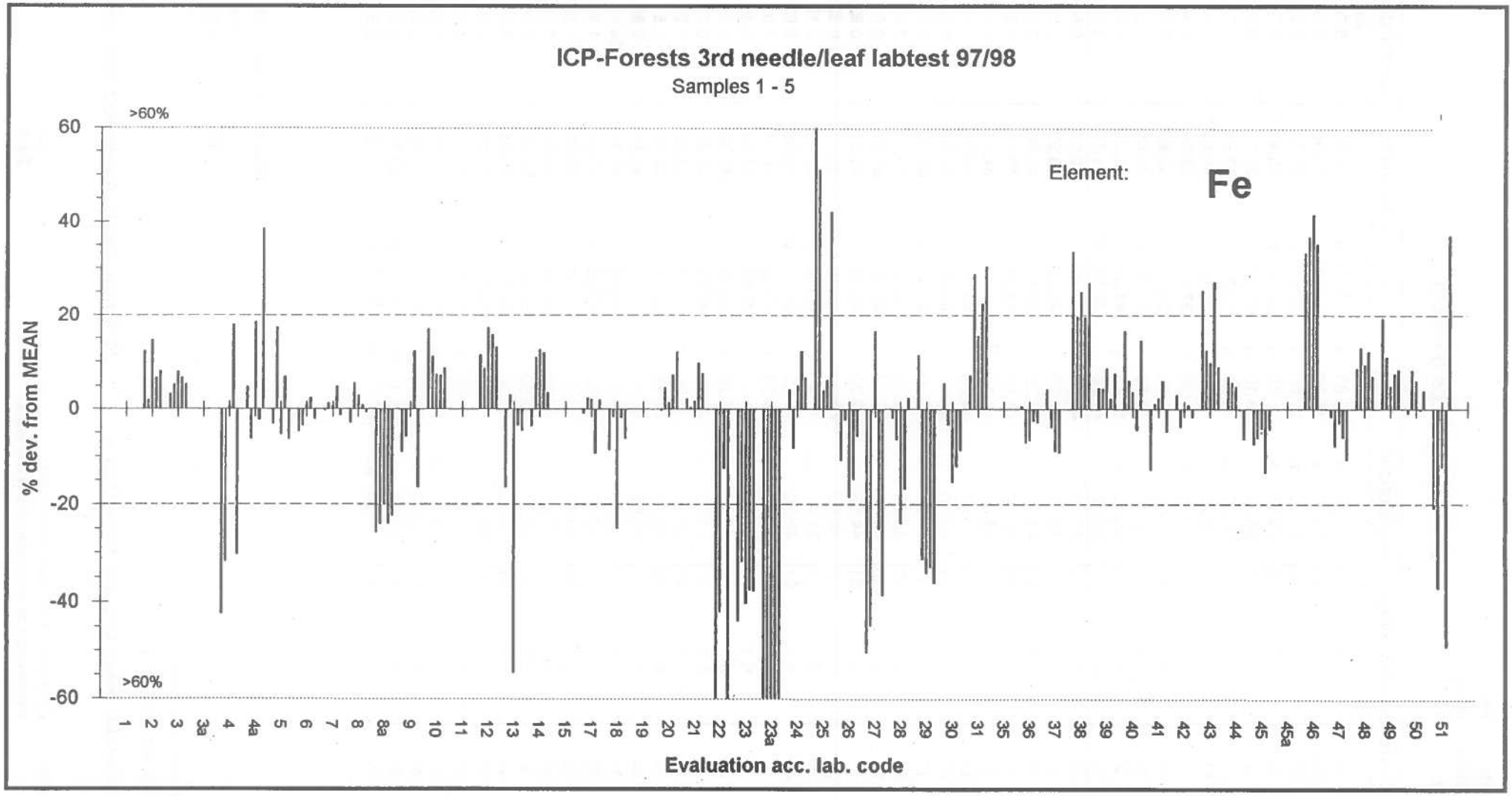
No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23	3.3	31	734.00	ab	913.00	a	1014.00	ab	**913.00 ***	141.80	15.53
2	24	6.5	20	999.99	a	999.99	a	1000.00	a	**999.99 ***	0.01	0.00
3	23a	6.1	31	931.00	ab	1009.00	a	1018.00	a	**1008.49 ***	47.84	4.74
4	8a	3.31	31	1050.00	a	1050.00	a	1040.00	a	**1046.67 ***	5.77	0.55
5	18	3.8	31	1124.00	ab	1062.00	ab	1087.00	a	**1087.00**	31.19	2.87
6	5	3.3	20	1191.00		1196.00		1181.00		**1189.33**	7.64	0.64
7	30	3.6	20	1226.00		1212.00		1212.00		**1216.67**	8.08	0.66
8	22	0	0	1220.00		1230.00		1210.00		**1220.00**	10.00	0.82
9	47	4.1	31	1275.00	b	1233.00		1212.00	b	**1233.00**	32.08	2.60
10	14	4.1	20	1244.20		1233.90		1280.00	b	**1244.20**	24.20	1.95
11	27	6.1	20	1250.00		1250.00		1225.00	b	**1244.99**	14.43	1.16
12	44	4.1	31	1263.00		1379.00	b	1250.00		**1263.00**	71.02	5.62
13	4a	2	41	1272.00		1267.00		1260.00		**1266.33**	6.03	0.48
14	46	5.6	31	1248.00	b	1269.00		1280.00		**1269.00**	16.26	1.28
15	17	5.4	31	1278.00		1289.00		1182.00	b	**1278.00**	58.86	4.61
16	6	5.6	31	1285.00		1277.00		1277.00		**1279.67**	4.62	0.36
17	29	5.1	31	1280.00		1278.00		1325.00	b	**1284.01**	26.58	2.07
18	26	3.2	31	1268.00	b	1297.00		1296.00		**1291.49**	16.46	1.27
19	10	6.1	20	1356.00	b	1287.00		1298.00		**1298.00**	37.07	2.86
20	51	2	41	1292.00		1321.00		1305.00		**1305.00**	14.53	1.11
21	40	5.5	31	1398.00	b	1277.00	b	1311.00		**1311.00**	62.40	4.76
22	39	5.4	31	1327.00		1303.00		1314.00		**1314.00**	12.01	0.91
23	45	3.1	31	1316.00		1322.00		1309.00		**1315.67**	6.51	0.49
24	7	3.2	31	1319.00	b	1339.00		1349.00		**1338.99**	15.28	1.14
25	50	4.1	31	1361.00	b	1344.00		1327.00	b	**1344.00**	17.00	1.26
26	36	3.3	20	1370.00	b	1342.00		1339.00		**1345.51**	17.10	1.27
27	20	5.1	20	1349.00		1353.00		1333.00		**1345.99**	10.58	0.79
28	37	6.1	30	1340.00		1360.00		1360.00		**1354.99**	11.55	0.85
29	4	2	40	1364.00		1356.00		1361.00		**1360.33**	4.04	0.30
30	49	4.1	31	1324.00	b	1371.00		1372.00		**1366.49**	27.43	2.01
31	3	3.7	31	1386.00		1376.00		1380.00		**1380.67**	5.03	0.36
32	41	4.1	31	1380.00		1393.00		1389.00		**1387.33**	6.66	0.48
33	8	3.91	31	1376.00	b	1403.00		1401.00		**1396.99**	15.04	1.08
34	42	4.1	31	1399.00		1409.00		1389.00		**1399.00**	10.00	0.71
35	43	4.1	31	1400.00		1410.00		1390.00		**1400.00**	10.00	0.71
36	25	5.1	31	1410.00		1382.00	b	1455.00	b	**1410.00**	36.83	2.61
37	28	5.1	20	1411.00		1413.00		1455.00	b	**1417.01**	24.85	1.75
38	48	4.1	31	1414.00		1425.00		1427.00		**1422.00**	7.00	0.49
39	12	5.1	31	1412.00	b	1429.00		1457.00	b	**1429.00**	22.72	1.59
40	9	5.1	31	1446.00		1442.00		1450.00		**1446.00**	4.00	0.28
41	2	5.2	31	1443.00		1458.00		1456.00		**1452.33**	8.14	0.56
42	21	5.4	31	1463.00		1478.00		1479.00		**1473.49**	8.96	0.61
43	38	4.3	31	1480.00		1490.00		1500.00		**1490.00**	10.00	0.67
44	31	3.5	20	1502.00	a	1524.00	ab	1491.00	a	**1502.00**	16.80	1.12
45	1	3.6	20	1480.00	ab	1521.00	a	1521.00	a	**1515.99**	23.67	1.56
46	13	3.3	20	1718.00	a	1739.00	ab	1698.00	ab	**1718.00 ***	20.50	1.19

Mean	Interlab.std. deviation	
	abs.	rel.%
1328.00	**21.49**	**1.76**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**46**
	Percentage of non-tolerable lab means:	**10.9**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Fe
>60%
>60%
60
40
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-20
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-60
% dev. from MEAN
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Evaluation acc. lab. code

Element: Fe
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications						Lab.mean		Lab.standard deviation abs.	Lab.standard deviation rel.%
1	22	0	0	0.00	a	0.00	a	0.00	a	**0.00**	*	0.00	
2	23a	6.1	31	13.90	a	15.30	a	14.60	a	**14.60**	*	0.70	4.79
3	27	6.1	20	22.00	a	22.50	a	23.00	a	**22.50**	*	0.50	2.22
4	23	3.3	31	24.70	a	25.50	a	26.10	a	**25.43**	*	0.70	2.75
5	4	2	40	26.20	a	26.10	a	26.10	a	**26.13**	*	0.06	0.23
6	8a	3.31	31	34.20	a	32.20	a	34.20	a	**33.64**	*	1.15	3.42
7	51	2	41	36.20		35.20		36.40		**35.93**	*	0.64	1.78
8	13	3.3	20	42.60	b	34.30	b	37.90		**37.90**		4.16	10.98
9	41	4.1	31	41.50	b	39.60		28.30	b	**39.60**		7.14	18.03
10	26	3.2	31	40.50		39.40		43.70	b	**40.51**		2.23	5.50
11	9	5.1	31	38.90	b	52.80	b	41.30		**41.30**		7.43	17.99
12	18	6.5	31	40.10		41.50		46.50	b	**41.50**		3.36	8.10
13	45	3.1	31	41.40		42.40		42.40		**42.07**		0.58	1.38
14	6	5.6	31	42.10		44.20		43.50		**43.29**		1.07	2.47
15	14	4.1	20	43.80		45.20		40.80	b	**43.80**		2.25	5.14
16	5	3.3	20	42.30		44.80		44.30		**43.99**		1.32	3.00
17	8	3.91	31	43.00		46.10	b	44.10		**44.11**		1.57	3.56
18	28	5.1	20	45.40		44.80		43.10		**44.54**		1.19	2.67
19	47	4.1	31	43.50		45.50		45.00		**44.69**		1.04	2.33
20	17	5.4	31	47.20	b	45.00		43.20	b	**45.00**		2.00	4.44
21	50	4.1	31	45.00		46.60		43.90		**45.01**		1.36	3.02
22	20	5.1	20	44.40		45.20		46.20		**45.27**		0.90	1.99
23	7	3.2	31	44.60		46.20		45.10		**45.30**		0.82	1.81
24	36	3.3	20	45.90		46.20		45.10		**45.73**		0.57	1.25
25	21	5.4	31	51.40	b	45.70		46.10		**46.46**		3.18	6.84
26	42	4.1	31	46.30		46.30		51.30	b	**46.86**		2.89	6.17
27	3	3.7	31	47.00		45.00	b	48.00		**46.94**		1.53	3.26
28	37	6.1	30	46.90		47.40		47.80		**47.37**		0.45	0.95
29	24	6.5	20	47.40		45.20	b	49.00		**47.40**		1.91	4.03
30	39	5.4	31	47.00		47.70		47.90		**47.53**		0.47	0.99
31	4a	2	41	47.40		47.90		47.60		**47.63**		0.25	0.52
32	30	6.1	20	48.41		48.67		42.43	b	**47.98**		3.53	7.36
33	44	4.1	31	58.60	b	48.60		45.50	b	**48.60**		6.85	14.09
34	31	3.5	20	90.60	b	48.30		48.10		**48.76**		24.48	50.21
35	48	4.1	31	50.40		49.50		47.50	b	**49.39**		1.48	3.00
36	12	5.1	31	49.40		50.60		52.10		**50.60**		1.35	2.67
37	29	5.1	31	50.60		49.80		51.50		**50.63**		0.85	1.68
38	2	5.2	31	52.00		50.00		50.90		**50.97**		1.00	1.96
39	40	5.5	31	54.00		52.30		52.60		**52.97**		0.91	1.72
40	10	6.1	20	53.20		51.70		54.50		**53.20**		1.40	2.63
41	49	4.1	31	54.20		50.60	b	57.70	b	**54.20**		3.55	6.55
42	43	4.1	31	49.00	ab	57.00	a	58.00	a	**56.94**	*	4.93	8.66
43	46	5.6	31	62.20	a	60.60	a	58.10	ab	**60.60**	*	2.07	3.42
44	38	4.3	31	60.70	a	63.40	ab	56.10	ab	**60.70**	*	3.69	6.08
45	25	5.1	31	94.90	ab	100.50	ab	97.10	a	**97.10**	*	2.82	2.90

Mean	Interlab.std. deviation abs.	Interlab.std. deviation rel.%
45.45	**2.50**	**5.56**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**45**
	Percentage of non-tolerable lab means:	**24.4**

Element: Fe
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	22	0	0	10.00	a	0.00	ab	10.00	a	9.11 *	5.77	63.34
2	23a	6.1	31	24.50	a	24.60	a	24.70	a	24.60 *	0.10	0.41
3	27	6.1	20	38.50	a	38.00	a	38.00	a	38.17 *	0.29	0.76
4	51	2	41	43.40	a	44.00	a	43.00	a	43.47 *	0.50	1.15
5	23	3.3	31	52.70	ab	47.20	a	45.10	a	47.20 *	3.92	8.31
6	4	2	40	47.60	a	44.20	ab	48.70	a	47.26 *	2.35	4.97
7	29	5.1	31	47.30	a	46.00	a	50.70	ab	47.54 *	2.43	5.11
8	8a	3.31	31	53.90	a	51.60	a	52.10	a	52.53 *	1.21	2.30
9	24	6.5	20	63.40		63.40		64.00		63.60	0.35	0.55
10	47	4.1	31	63.60		64.70		63.40		63.90	0.70	1.10
11	36	3.3	20	65.00		63.60		64.80		64.47	0.76	1.18
12	28	5.1	20	64.90		59.90	b	67.20		64.90	3.73	5.75
13	4a	2	41	65.30		65.90		63.60		64.93	1.19	1.83
14	45	3.1	31	66.20		64.00		65.10		65.10	1.10	1.69
15	9	5.1	31	64.90		76.80	b	63.90		65.29	7.18	11.00
16	37	6.1	30	66.30		67.00		66.70		66.67	0.35	0.52
17	42	4.1	31	66.40		65.40		72.40	b	66.79	3.79	5.67
18	6	5.6	31	69.80	b	65.50		66.50		66.89	2.25	3.36
19	30	6.1	20	65.30		67.00		81.00	b	67.04	8.62	12.86
20	26	3.2	31	62.60	b	67.90		69.40		67.76	3.57	5.27
21	18	6.5	31	67.20		67.30		81.10	b	68.14	8.00	11.74
22	21	5.4	31	70.20		70.10		68.80		69.70	0.78	1.12
23	41	4.1	31	70.20		67.70		78.20	b	70.20	5.48	7.81
24	7	3.2	31	69.20		74.90	b	69.70		70.34	3.16	4.49
25	2	5.2	31	72.40		69.20		70.70		70.77	1.60	2.26
26	17	5.4	31	73.90	b	71.10		65.40	b	71.10	4.33	6.09
27	13	3.3	20	70.50		77.50	b	70.70		71.49	3.98	5.57
28	39	5.4	31	74.40		70.40		72.50		72.50	2.00	2.76
29	20	5.1	20	72.10		71.30		74.50		72.59	1.67	2.30
30	3	3.7	31	73.00		72.00		74.00		73.00	1.00	1.37
31	8	3.91	31	74.70		72.20		72.80		73.23	1.31	1.79
32	44	4.1	31	84.40	b	65.70	b	73.40		73.40	9.40	12.81
33	40	5.5	31	75.30		73.80		68.50	b	73.66	3.57	4.85
34	50	4.1	31	73.00		75.10		81.00	b	75.10	4.15	5.53
35	12	5.1	31	74.60		76.60		74.90		75.37	1.08	1.43
36	14	4.1	20	76.90		74.10	b	85.20	b	76.90	5.77	7.50
37	49	4.1	31	77.00		77.90		76.20		77.03	0.85	1.10
38	10	6.1	20	79.60		76.90		75.40		77.04	2.13	2.76
39	43	4.1	31	74.00	b	78.00		83.00	b	78.00	4.51	5.78
40	48	4.1	31	73.40	b	78.40		87.40	b	78.40	7.09	9.04
41	5	3.3	20	81.40		89.40	b	67.80	b	81.40	10.92	13.42
42	38	4.3	31	83.90		80.90		84.10		83.11	1.79	2.15
43	31	3.5	20	81.70	ab	89.40	a	91.30	a	89.40 *	5.08	5.68
44	46	5.6	31	94.90	a	95.70	a	93.90	a	94.83 *	0.90	0.95
45	25	5.1	31	99.70	ab	106.70	a	104.80	a	104.80 *	3.62	3.45

Mean	Interlab.std. deviation	
	abs.	rel.%
69.38	**3.21**	**5.80**

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	24.4

Element: Fe
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	23a	6.1	31	34.50	a	33.40	a	35.30	a	34.40	*	0.95	2.76
2	13	3.3	20	71.00	a	73.30	a	70.00	a	71.43	*	1.69	2.37
3	22	0	0	90.00	a	100.00	ab	90.00	a	91.11	*	5.77	6.33
4	23	3.3	31	93.90	a	99.10	ab	86.20	ab	93.90	*	6.49	6.91
5	29	5.1	31	101.90	a	106.90	a	102.90	a	103.51	*	2.65	2.56
6	18	6.5	31	94.80	ab	119.00	a	119.00	a	117.89	*	13.97	11.85
7	28	5.1	20	116.10	a	119.70	a	122.70	a	119.70	*	3.30	2.76
8	8a	3.31	31	124.00		128.00		125.00		125.61	*	2.08	1.66
9	26	3.2	31	124.10	b	129.60		128.90		128.14		2.99	2.33
10	30	6.1	20	141.50	b	132.50		131.40		133.06		5.54	4.16
11	51	2	41	143.00	b	128.00	b	138.00		138.00		7.64	5.54
12	37	6.1	30	142.00		145.00		143.00		143.33		1.53	1.07
13	36	3.3	20	148.50		145.10		147.20		146.93		1.72	1.17
14	5	3.3	20	160.90	b	143.90	b	148.90		148.90		8.74	5.87
15	45	3.1	31	152.00		152.00		142.00	b	150.89		5.77	3.82
16	47	4.1	31	157.00	b	149.80		152.70		152.70		3.62	2.37
17	42	4.1	31	159.30		154.20		156.20		156.31		2.57	1.64
18	9	5.1	31	159.40		155.80		156.20		157.11		1.97	1.25
19	4	2	40	157.10		161.00		157.70		158.51		2.10	1.32
20	7	3.2	31	157.40		159.90		158.60		158.63		1.25	0.79
21	6	5.6	31	158.30		159.80		158.80		158.97		0.76	0.48
22	20	5.1	20	164.30	b	159.80		156.10		159.80		4.11	2.57
23	21	5.4	31	161.50		161.20		157.70		160.24		2.11	1.32
24	17	5.4	31	159.70		166.30	b	159.90		160.91		3.75	2.33
25	41	4.1	31	160.60		161.80		161.30		161.23		0.60	0.37
26	8	3.91	31	163.10		159.00		163.30		162.09		2.43	1.50
27	40	5.5	31	163.40		168.70	b	153.60	b	163.40		7.66	4.69
28	25	5.1	31	165.90		164.00		156.40	b	163.84		5.03	3.07
29	44	4.1	31	173.70	b	164.90		163.30		165.21		5.60	3.39
30	49	4.1	31	165.20		166.50		164.00		165.23		1.25	0.76
31	24	6.5	20	165.60		165.60		165.00		165.40		0.35	0.21
32	50	4.1	31	170.30		163.00	b	167.00		167.00		3.66	2.19
33	10	6.1	20	172.30		169.30		166.90		169.30		2.71	1.60
34	3	3.7	31	176.00	b	170.00		167.00		170.00		4.58	2.69
35	39	5.4	31	171.10		171.40		171.10		171.20		0.17	0.10
36	48	4.1	31	170.90		174.10		172.40		172.47		1.60	0.93
37	43	4.1	31	165.00	b	177.00	b	173.00		173.00		6.11	3.53
38	14	4.1	20	177.20		180.40		174.90		177.20		2.76	1.56
39	2	5.2	31	166.30	b	223.80	b	180.50		180.50		29.95	16.59
40	31	3.5	20	194.10	b	182.10		173.30	b	182.10		10.44	5.73
41	27	6.1	20	109.00	b	183.50		190.00	b	183.50		45.01	24.53
42	12	5.1	31	183.70		183.50		190.60	b	184.71		4.04	2.19
43	4a	2	41	186.50		186.80		186.40		186.57		0.21	0.11
44	38	4.3	31	197.00	a	199.00	a	188.00	ab	196.89	*	5.86	2.98
45	46	5.6	31	225.90	a	209.40	ab	222.80	a	222.80	*	8.77	3.94

Mean	Interlab.std. deviation	
	abs.	rel.%
157.50	5.37	3.51

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	22.2

Element: Fe
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes pretreatm.	determ.	Replications						Lab.mean	Lab.standard deviation abs.	rel.%
1	23a	6.1	31	114.90	a	124.90	a	119.00	a	119.17 *	5.03	4.22
2	51	2	41	157.00	a	159.00	a	155.00	a	157.00 *	2.00	1.27
3	23	3.3	31	188.70	a	209.20	ab	192.30	a	192.72 *	10.95	5.68
4	29	5.1	31	206.90	a	202.90	a	211.90	a	207.12 *	4.51	2.18
5	27	6.1	20	233.00	a	231.50	a	228.00	a	230.83 *	2.57	1.11
6	8a	3.31	31	234.00	a	240.00	a	231.00	a	234.72 *	4.58	1.95
7	28	5.1	20	265.00	b	257.00		230.00	b	257.00	18.34	7.14
8	26	3.2	31	263.00		276.30	b	245.60	b	263.00	15.40	5.86
9	45	3.1	31	266.00		267.00		269.00		267.33	1.53	0.57
10	22	0	0	280.00	b	270.00		260.00	b	270.00	10.00	3.70
11	30	6.1	20	272.90		268.20		273.40		271.50	2.87	1.06
12	17	5.4	31	279.30		277.70		283.60		280.20	3.05	1.09
13	37	6.1	30	281.00		279.00		282.00		280.67	1.53	0.55
14	47	4.1	31	291.60		287.10		292.20		290.30	2.79	0.96
15	40	5.5	31	295.40		299.90		291.20		295.50	4.35	1.47
16	13	3.3	20	298.20		307.80	b	292.00		298.20	7.96	2.67
17	36	3.3	20	296.50		301.30		308.80	b	301.30	6.20	2.06
18	4a	2	41	301.60		301.20		302.50		301.77	0.67	0.22
19	18	6.5	31	264.40	b	315.30	b	303.40		303.40	26.63	8.78
20	50	4.1	31	308.70		312.70		294.60	b	308.48	9.51	3.08
21	44	4.1	31	308.50		294.50	b	323.80	b	308.50	14.65	4.75
22	8	3.91	31	311.80		306.10		321.40	b	311.80	7.73	2.48
23	42	4.1	31	309.30		343.40	b	310.30		312.02	19.41	6.22
24	39	5.4	31	315.80		317.50		315.20		316.17	1.19	0.38
25	6	5.6	31	317.90		315.50		316.50		316.63	1.21	0.38
26	7	3.2	31	321.40		325.90		324.40		323.90	2.29	0.71
27	41	4.1	31	323.50		336.90	b	327.30		327.62	6.91	2.11
28	25	5.1	31	328.20		324.60		332.00		328.27	3.70	1.13
29	2	5.2	31	347.00	b	330.00		323.30		330.00	12.22	3.70
30	3	3.7	31	332.00		326.00		332.00		330.00	3.46	1.05
31	5	3.3	20	325.50		330.50		335.50		330.50	5.00	1.51
32	10	6.1	20	330.20		332.50		331.50		331.40	1.15	0.35
33	20	5.1	20	332.10		334.60		328.00		331.57	3.33	1.00
34	49	4.1	31	332.30		337.30		327.20		332.30	5.05	1.52
35	21	5.4	31	342.70		338.20		336.80		339.23	3.08	0.91
36	14	4.1	20	345.70		328.60	b	363.80	b	345.70	17.60	5.09
37	48	4.1	31	347.20		340.70		349.70		346.23	4.65	1.34
38	9	5.1	31	346.70		351.90		335.80	b	346.70	8.22	2.37
39	24	6.5	20	343.20		348.00		349.00		346.73	3.10	0.89
40	12	5.1	31	354.30		357.10		365.20	b	357.92	5.66	1.58
41	4	2	40	364.20		380.20	b	358.60		364.20	11.21	3.08
42	38	4.3	31	369.00		378.00	b	366.00		369.72	6.24	1.69
43	31	3.5	20	382.40		379.30		368.90	b	378.63 *	7.07	1.87
44	43	4.1	31	380.00	ab	393.00	a	400.00	ab	393.00 *	10.15	2.58
45	46	5.6	31	417.60	a	433.20	ab	411.40	a	417.60 *	11.23	2.69

Mean	Interlab.std. deviation abs.	rel.%
309.10	7.02	2.38

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	45
	Percentage of non-tolerable lab means:	20.0
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	310.70

Element: Fe
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

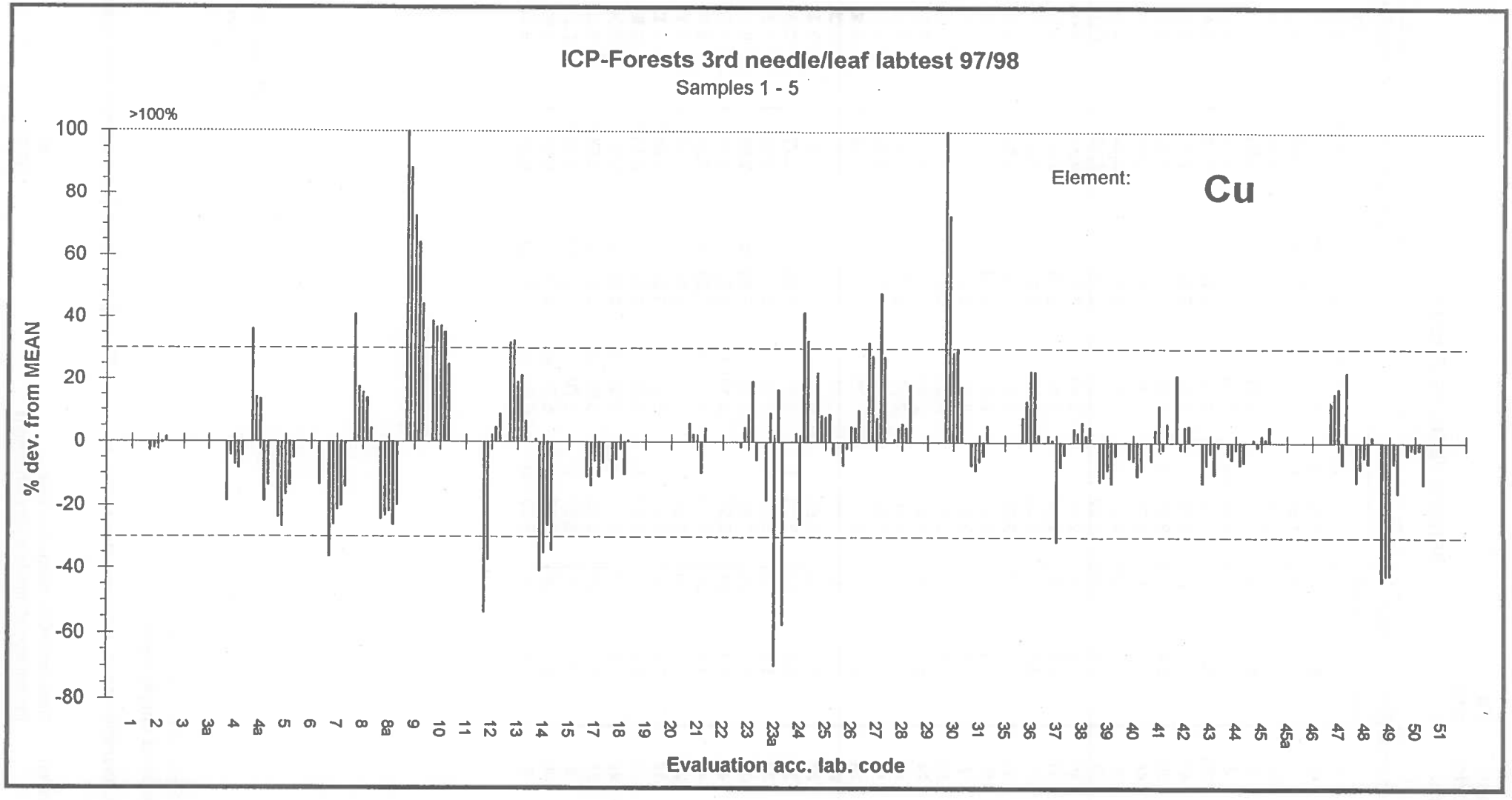
No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications						Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	22	0	0	20.00	ab	10.00	a	10.00	a	10.56 *	5.77	54.64
2	23a	6.1	31	26.10	a	26.60	a	26.60	a	26.43 *	0.29	1.10
3	27	6.1	20	40.00	ab	43.00	a	74.50	ab	43.00 *	19.11	44.44
4	23	3.3	31	43.80	a	44.60	a	42.20	a	43.64 *	1.22	2.80
5	29	5.1	31	44.20	a	46.30	a	44.30	a	44.81 *	1.18	2.63
6	4	2	40	49.20	a	46.70	ab	49.70	a	48.89 *	1.61	3.29
7	8a	3.31	31	54.50		54.30		54.50		54.43 *	0.12	0.22
8	9	5.1	31	42.80	b	58.60		61.50	b	58.60	10.06	17.17
9	47	4.1	31	63.20		63.00		61.80		62.67	0.76	1.21
10	30	6.1	20	63.44		64.42		64.51		64.12	0.59	0.92
11	44	4.1	31	65.80		72.90	b	64.60		65.80	4.49	6.82
12	5	3.3	20	65.00		65.50		68.00	b	65.81	1.61	2.45
13	18	6.5	31	61.40	b	65.90		70.70	b	65.90	4.65	7.06
14	26	3.2	31	65.40		65.90		70.70	b	66.21	2.93	4.43
15	41	4.1	31	66.00		68.10		66.70		66.91	1.07	1.60
16	13	3.3	20	65.80		67.20		68.10		67.09	1.16	1.73
17	45	3.1	31	67.80		67.80		65.50		67.24	1.33	1.98
18	36	3.3	20	68.30		66.70		69.40		68.29	1.36	1.99
19	6	5.6	31	69.80		67.90		68.50		68.73	0.97	1.41
20	42	4.1	31	70.50		68.50		68.50		69.06	1.15	1.67
21	7	3.2	31	68.90		69.50		69.60		69.33	0.38	0.55
22	8	3.91	31	69.90		70.00		69.30		69.73	0.38	0.54
23	37	6.1	30	69.80		70.60		70.40		70.27	0.42	0.60
24	17	5.4	31	70.50		71.70		74.90	b	71.70	2.27	3.17
25	28	5.1	20	68.00	b	72.00		79.00	b	72.00	5.57	7.74
26	14	4.1	20	72.80		64.80	b	75.30	b	72.80	5.48	7.53
27	50	4.1	31	71.00	b	74.10		73.10		73.04	1.58	2.16
28	3	3.7	31	74.00		77.00	b	73.00		74.06	2.08	2.81
29	24	6.5	20	75.10		75.10		75.00		75.07	0.06	0.08
30	48	4.1	31	74.40		76.80		75.00		75.26	1.25	1.66
31	21	5.4	31	75.40		74.80		77.10		75.66	1.19	1.57
32	39	5.4	31	75.40		75.30		76.40		75.70	0.61	0.81
33	2	5.2	31	75.30		76.40		76.10		75.93	0.57	0.75
34	49	4.1	31	76.20		77.80		71.10	b	76.20	3.50	4.59
35	10	6.1	20	78.40	b	76.40		74.60	b	76.40	1.90	2.49
36	43	4.1	31	81.00	b	76.00		76.00		76.56	2.89	3.77
37	20	5.1	20	78.70		79.30		78.40		78.80	0.46	0.58
38	12	5.1	31	78.60		79.20		81.60	b	79.46	1.59	2.00
39	40	5.5	31	72.70	b	83.40	b	80.50		80.50	5.53	6.87
40	38	4.3	31	88.60	a	93.60	ab	88.70	a	89.21 *	2.86	3.21
41	31	3.5	20	81.60	ab	91.60	a	102.30	ab	91.60 *	10.35	11.30
42	51	2	41	95.50	a	97.20	a	96.10	a	96.27 *	0.86	0.89
43	4a	2	41	98.50	a	96.10	a	97.30	a	97.30 *	1.20	1.23
44	25	5.1	31	97.30	ab	102.50	ab	99.90	a	99.90 *	2.60	2.60

Mean	Interlab.std. deviation abs.	Interlab.std. deviation rel.%
70.29	2.66	5.21

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	44
	Percentage of non-tolerable lab means:	27.3


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>100%
Element:
Cu
% dev. from MEAN
100
80
60
40
20
0
-20
-40
-60
-80
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
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26
27
28
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35
36
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38
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41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

Element: Cu
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	12	5.1	31	1.22 a	1.05 ab	2.60 ab	1.22 *	0.85	69.67
2	49	4.1	31	1.48 a	0.82 ab	2.14 ab	1.48 *	0.66	44.59
3	7	3.2	31	1.68 a	1.60 a	1.75 a	1.68 *	0.08	4.76
4	8a	3.31	31	2.08	1.91	2.02	2.00	0.09	4.50
5	5	3.3	20	2.01	2.01	2.01	2.01	0.00	0.00
6	4	2	40	2.50 b	2.10	2.10	2.15	0.23	10.70
7	23a	6.1	31	1.92 b	2.72 b	2.16	2.16	0.41	18.98
8	43	4.1	21	2.36	2.30	2.28	2.31	0.04	1.73
9	39	5.4	31	2.63 b	2.26	2.28	2.32	0.21	9.05
10	48	4.1	31	2.28	2.28	2.41	2.32	0.08	3.45
11	18	3.8	31	2.23	2.36	2.43	2.34	0.10	4.27
12	17	5.4	31	2.33	2.38	2.34	2.35	0.03	1.28
13	26	3.2	31	2.44	2.40	2.51	2.45	0.06	2.45
14	31	3.5	20	2.57	2.45	2.18 b	2.45	0.20	8.16
15	41	4.1	21	2.49	2.69 b	2.30 b	2.49	0.20	8.03
16	44	4.1	31	2.81 b	2.54	2.34 b	2.54	0.24	9.45
17	50	4.1	31	2.49	2.61	2.53	2.54	0.06	2.36
18	2	5.2	31	2.67	2.57	2.43	2.57	0.12	4.67
19	23	3.3	31	2.51	2.68	2.61	2.60	0.09	3.46
20	24	6.5	20	2.63	2.63	2.68	2.65	0.03	1.13
21	40	5.5	31	2.64	2.55	2.77	2.65	0.11	4.15
22	14	4.1	31	2.68	3.10 b	2.52	2.68	0.30	11.19
23	28	5.1	20	2.63	2.83	2.63	2.68	0.12	4.48
24	45	3.1	31	2.72	2.61	2.71	2.68	0.06	2.24
25	37	6.1	32	2.68	2.74	2.70	2.71	0.03	1.11
26	38	4.3	31	3.14 b	2.76	2.68	2.77	0.25	9.03
27	21	5.4	31	3.22 b	2.78	2.74	2.81	0.27	9.61
28	36	3.3	20	2.96	2.86	2.69 b	2.86	0.14	4.90
29	47	4.1	31	2.97	3.18 b	2.89	2.98	0.15	5.03
30	42	4.1	21	3.22	4.02 b	2.62 b	3.22	0.70	21.74
31	25	5.1	31	3.25	3.12	3.34	3.24	0.11	3.40
32	13	3.3	21	3.51	3.60	3.36	3.50 *	0.12	3.43
33	27	6.1	20	4.00 b	3.50	3.00 b	3.50 *	0.50	14.29
34	4a	2	41	3.67 a	3.60 a	3.56 a	3.61 *	0.06	1.66
35	10	6.1	20	3.73 a	3.63 a	3.67 a	3.68 *	0.05	1.36
36	8	3.91	31	3.67 a	3.70 a	4.04 ab	3.74 *	0.21	5.61
37	30	6.1	20	5.39 a	5.71 ab	4.51 ab	5.39 *	0.62	11.50
38	9	5.1	31	5.53 ab	6.34 a	6.62 ab	6.34 *	0.57	8.99

Mean	Interlab.std. deviation	
	abs.	rel.%
2.65	**0.21**	**8.85**

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	38
	Percentage of non-tolerable lab means:	26.3

Element: Cu
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	49	4.1	31	2.03	a	1.39	ab	2.67	ab	2.03 *	0.64	31.53
2	14	4.1	31	2.30	ab	2.07	a	1.90	ab	2.07 *	0.20	9.66
3	12	5.1	31	1.88	ab	2.35	a	2.20	a	2.20 *	0.24	10.91
4	5	3.3	20	2.51	a	3.01	ab	2.51	a	2.57	0.29	11.28
5	7	3.2	31	2.58		2.70		2.50		2.59	0.10	3.86
6	8a	3.31	31	2.70		2.66		2.72		2.69	0.03	1.12
7	17	5.4	31	3.05		2.99		3.04		3.03	0.03	0.99
8	39	5.4	31	3.18		3.09		3.09		3.12	0.05	1.60
9	31	3.5	20	3.40	b	3.11		3.18		3.20	0.15	4.69
10	48	4.1	31	3.14		3.31		3.22		3.22	0.09	2.80
11	43	4.1	21	3.28		3.25		3.25		3.26	0.02	0.61
12	18	3.8	31	3.20		3.31		3.45		3.31	0.13	3.93
13	44	4.1	31	3.60	b	3.07	b	3.32		3.32	0.27	8.13
14	40	5.5	31	3.35		3.25		3.40		3.33	0.08	2.40
15	4	2	40	3.30		3.30		3.70	b	3.36	0.23	6.85
16	42	4.1	21	4.22	b	3.42		3.32		3.43	0.49	14.29
17	50	4.1	31	3.53		3.15	b	3.44		3.43	0.20	5.83
18	2	5.2	31	3.50		3.50		3.28	b	3.44	0.13	3.78
19	26	3.2	31	3.52		3.36		3.45		3.44	0.08	2.33
20	45	3.1	31	3.53		3.42		3.42		3.46	0.06	1.73
21	37	6.1	32	3.51		3.56		3.57		3.55	0.03	0.85
22	21	5.4	31	3.68		3.66		3.48		3.61	0.11	3.05
23	24	6.5	20	3.17	b	3.68		3.68		3.62	0.29	8.01
24	38	4.3	31	3.63		3.74		3.48		3.63	0.13	3.58
25	41	4.1	21	3.45	b	3.83	b	3.66		3.66	0.19	5.19
26	28	5.1	20	3.67		3.65		3.72		3.68	0.04	1.09
27	23	3.3	31	3.69		3.47	b	4.49	b	3.69	0.54	14.63
28	25	5.1	31	3.84		3.72		3.91		3.82	0.10	2.62
29	23a	6.1	31	3.04	b	5.48	b	3.84		3.84	1.24	32.29
30	36	3.3	20	3.90		4.00		4.04		3.98	0.07	1.76
31	4a	2	41	4.10		3.97		4.00		4.02	0.07	1.74
32	47	4.1	31	4.12		4.00		4.08		4.07	0.06	1.47
33	8	3.91	31	4.16		4.07		4.18		4.14	0.06	1.45
34	27	6.1	20	4.50	a	4.00	ab	5.00	ab	4.50	0.50	11.11
35	13	3.3	21	4.26	ab	4.77	a	4.68	a	4.67 *	0.27	5.78
36	10	6.1	20	4.82	a	4.88	a	4.77	a	4.82 *	0.06	1.24
37	30	6.1	20	6.08	a	5.70	ab	6.34	ab	6.08 *	0.32	5.26
38	9	5.1	31	6.55	a	6.77	a	6.61	a	6.64 *	0.11	1.66

Mean	Interlab.std. deviation	
	abs.	rel.%
3.52	0.20	6.08

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation: Data sets >0 or >detection limit: 38
Percentage of non-tolerable lab means: 18.4

Element: Cu
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes pretreatm.	determ.	Replications			Lab.mean	Lab.standard deviation abs.	rel.%
1	23a	6.1	31	1.31 ab	1.10 a	0.99 a	1.10 *	0.16	14.55
2	49	4.1	31	2.12 a	2.63 ab	1.61 ab	2.12 *	0.51	24.06
3	14	4.1	31	2.37 a	2.62 ab	2.19 ab	2.37 *	0.22	9.28
4	37	6.1	32	2.44 a	2.51 a	2.59 a	2.51 *	0.08	3.19
5	24	6.5	20	3.20 b	2.67	2.67	2.71	0.31	11.44
6	8a	3.31	31	2.93	2.87	2.75	2.86	0.09	3.15
7	7	3.2	31	2.86	2.88	2.91	2.88	0.03	1.04
8	5	3.3	20	3.01	3.01	3.51 b	3.05	0.29	9.51
9	39	5.4	31	3.65 b	3.32	3.28	3.34	0.20	5.99
10	4	2	40	3.10 b	4.00 b	3.40	3.40	0.46	13.53
11	17	5.4	31	3.41	3.46	3.45	3.44	0.03	0.87
12	31	3.5	20	3.36	3.67 b	3.44	3.44	0.16	4.65
13	40	5.5	31	3.38	3.43	3.61	3.45	0.12	3.48
14	48	4.1	31	3.58	3.48	3.41	3.49	0.09	2.58
15	43	4.1	21	3.53	3.47	3.58	3.53	0.06	1.70
16	50	4.1	31	3.83 b	3.26 b	3.56	3.56	0.29	8.15
17	18	3.8	31	3.28 b	3.58	3.78 b	3.58	0.25	6.98
18	44	4.1	31	3.85 b	3.54	3.53	3.58	0.18	5.03
19	2	5.2	31	3.37 b	3.63	4.01 b	3.63	0.32	8.82
20	12	5.1	31	3.66	3.62	4.41 b	3.68	0.45	12.23
21	21	5.4	31	3.72	3.68	3.68	3.69	0.02	0.54
22	45	3.1	31	3.71	3.82	3.71	3.75	0.06	1.60
23	26	3.2	31	3.78	4.03	3.86	3.86	0.13	3.37
24	42	4.1	21	3.93	3.83	3.83	3.86	0.06	1.55
25	28	5.1	20	3.66 b	3.94	3.93	3.89	0.16	4.11
26	38	4.3	31	3.97	3.93	3.68 b	3.91	0.16	4.09
27	27	6.1	20	3.50 b	4.00	4.00	3.96	0.29	7.32
28	25	5.1	31	3.94	4.02	3.96	3.97	0.04	1.01
29	23	3.3	31	3.74 b	3.99	4.47 b	3.99	0.37	9.27
30	41	4.1	21	4.10	3.85 b	4.25	4.10	0.20	4.88
31	4a	2	41	4.20	3.74 b	4.22	4.17	0.27	6.47
32	8	3.91	31	4.34	4.23	4.18	4.25	0.08	1.88
33	47	4.1	31	4.31	4.30	4.29	4.30	0.01	0.23
34	13	3.3	21	4.31	4.83 b	4.37	4.38	0.28	6.39
35	36	3.3	20	4.41	4.67	4.51	4.51	0.13	2.88
36	30	6.1	20	4.22 ab	4.74 a	4.81 a	4.73	0.32	6.77
37	10	6.1	20	5.07 a	4.81 ab	5.09 a	5.04 *	0.16	3.17
38	9	5.1	31	5.53 ab	6.34 a	6.62 ab	6.34 *	0.57	8.99

Mean	Interlab.std. deviation abs.	rel.%
3.67	0.20	5.91

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 38
Percentage of non-tolerable lab means: 15.8

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cu
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications			Lab.mean	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	14	4.1	31	3.16 ab	2.99 a	2.83 a	**2.99**	0.17	5.69
2	8a	3.31	31	3.34 ab	3.00 a	2.88 a	**3.00**	0.24	8.00
3	7	3.2	31	3.22	3.26	3.28	**3.25**	0.03	0.92
4	4a	2	41	3.20	3.38	3.31	**3.31**	0.09	2.72
5	5	3.3	20	3.51	3.51	3.51	**3.51**	0.00	0.00
6	39	5.4	31	3.56	3.48	3.61	**3.55**	0.07	1.97
7	17	5.4	31	3.61	3.64	3.61	**3.62**	0.02	0.55
8	40	5.5	31	3.45 b	3.77	3.64	**3.64**	0.16	4.40
9	18	3.8	31	4.14 b	3.65	3.46 b	**3.65**	0.35	9.59
10	43	4.1	21	3.66	3.65	3.66	**3.66**	0.01	0.27
11	21	5.4	31	3.68	3.66	3.66	**3.67**	0.01	0.27
12	4	2	40	3.70	3.70	3.90 b	**3.73**	0.12	3.22
13	37	6.1	32	3.75	3.72	3.77	**3.75**	0.03	0.80
14	44	4.1	31	3.78	3.59 b	3.94	**3.78**	0.18	4.76
15	47	4.1	31	4.06 b	3.74	3.78	**3.79**	0.17	4.49
16	48	4.1	31	3.63 b	3.85	3.81	**3.80**	0.12	3.16
17	49	4.1	31	3.80	3.01 b	4.59 b	**3.80**	0.79	20.79
18	31	3.5	20	3.89	3.55 b	4.28 b	**3.89**	0.37	9.51
19	50	4.1	31	3.97	3.45 b	4.30 b	**3.97**	0.43	10.83
20	41	4.1	21	3.98	4.21 b	3.76 b	**3.98**	0.23	5.78
21	2	5.2	31	4.03	4.09	4.03	**4.05**	0.03	0.74
22	45	3.1	31	4.15	4.04	4.15	**4.12**	0.06	1.46
23	38	4.3	31	3.87 b	4.22	4.17	**4.16**	0.19	4.57
24	12	5.1	31	4.27	4.08 b	4.41	**4.27**	0.17	3.98
25	26	3.2	31	4.25	4.35	4.22	**4.27**	0.07	1.64
26	28	5.1	20	4.30	4.20	4.30	**4.27**	0.06	1.41
27	42	4.1	21	4.12 b	4.32	4.32	**4.29**	0.12	2.80
28	25	5.1	31	4.22 b	4.43	4.51	**4.43**	0.15	3.39
29	8	3.91	31	4.70	4.50	4.65	**4.64**	0.10	2.16
30	23a	6.1	31	3.76 b	4.75	4.92 b	**4.75**	0.63	13.26
31	23	3.3	31	4.86	5.23 b	4.25 b	**4.86**	0.49	10.08
32	13	3.3	21	5.00	4.94	4.64 b	**4.94**	0.19	3.85
33	36	3.3	20	4.90	5.00	5.15	**5.00**	0.13	2.60
34	30	6.1	20	5.28 a	5.53 ab	4.92 ab	**5.28**	0.30	5.68
35	10	6.1	20	5.48 a	5.48 a	5.62 a	**5.51 ***	0.08	1.45
36	24	6.5	20	5.28 ab	5.80 a	5.80 a	**5.77 ***	0.30	5.20
37	27	6.1	20	6.00 a	6.50 ab	6.00 a	**6.03 ***	0.29	4.81
38	9	5.1	31	6.80 a	6.69 a	6.04 ab	**6.69 ***	0.41	6.13

Mean	Interlab.std. deviation	
	abs.	rel.%
4.08	**0.19**	**4.55**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**38**
	Percentage of non-tolerable lab means:	**10.5**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**3.77**

Element: Cu
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

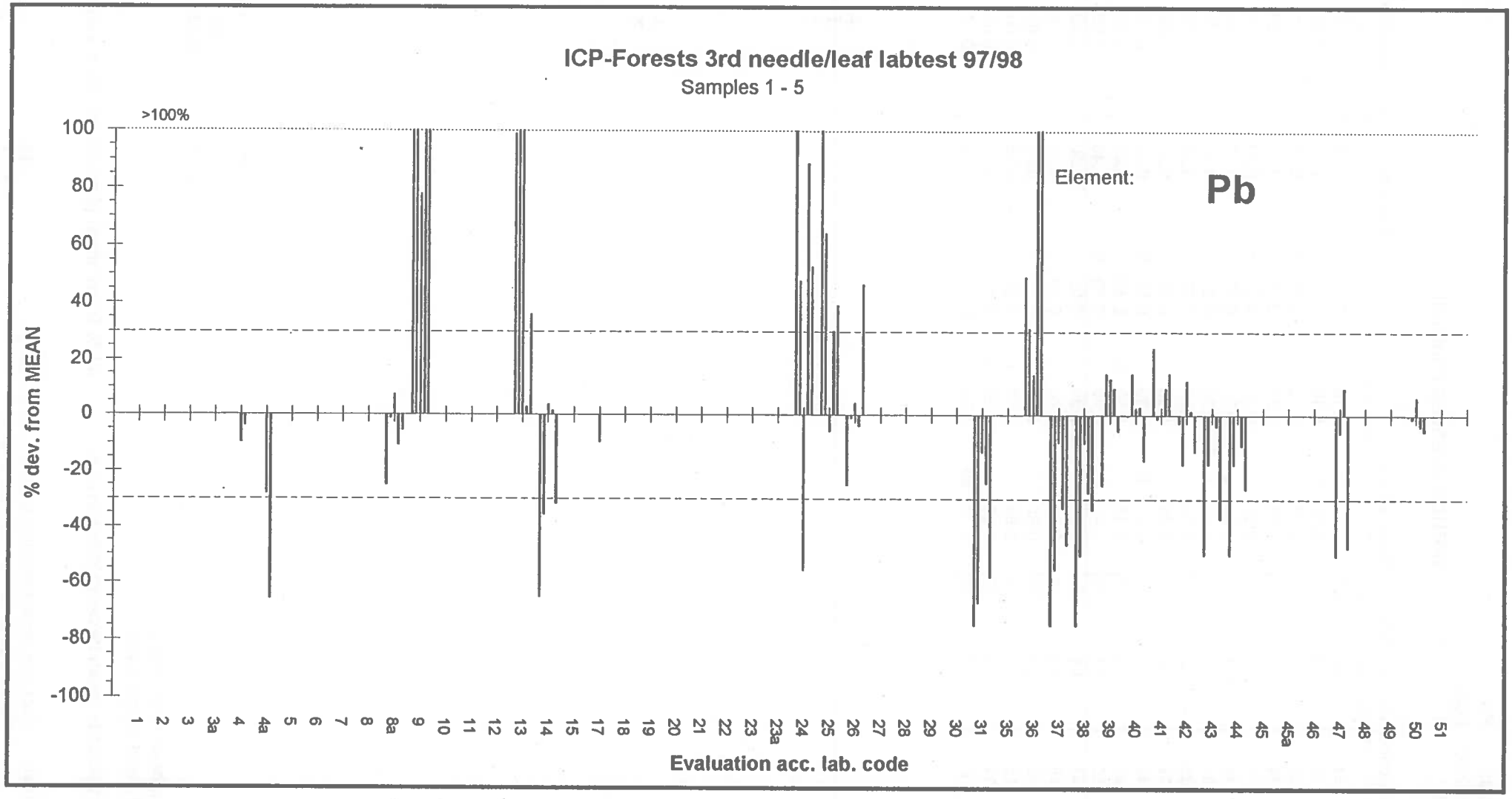
No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	2.94	ab	2.46	a	2.43	a	2.50 *	0.29	11.60
2	14	4.1	31	4.24	ab	3.66	a	3.85	a	3.85 *	0.30	7.79
3	8a	3.31	31	4.58		4.79		4.72		4.70	0.11	2.34
4	49	4.1	31	6.12	b	4.94		4.48	b	4.94	0.85	17.21
5	7	3.2	31	4.97		5.02		5.12		5.04	0.08	1.59
6	4a	2	41	5.02		5.02		5.14		5.06	0.07	1.38
7	6	5.6	31	5.04		5.10		5.09		5.08	0.03	0.59
8	50	4.1	31	5.04		5.22		5.07		5.11	0.10	1.96
9	40	5.5	31	5.41		5.39		5.26		5.35	0.08	1.50
10	17	5.4	31	5.52		5.45		5.44		5.47	0.04	0.73
11	44	4.1	31	5.50		6.12	b	5.26	b	5.50	0.44	8.00
12	23	3.3	31	5.53		5.08	b	5.94	b	5.53	0.43	7.78
13	5	3.3	20	5.50		5.50		6.00	b	5.56	0.29	5.22
14	4	2	40	5.30	b	5.60		5.80	b	5.60	0.25	4.46
15	39	5.4	31	5.90	b	5.42	b	5.62		5.62	0.24	4.27
16	25	5.1	31	5.65		5.72		5.47		5.63	0.13	2.31
17	37	6.1	32	5.59		5.63		5.66		5.63	0.04	0.71
18	43	4.1	21	5.82		5.66		5.85		5.78	0.10	1.73
19	42	4.1	21	5.94		5.74		5.84		5.84	0.10	1.71
20	18	3.8	31	6.02		5.91		5.52	b	5.91	0.26	4.40
21	2	5.2	31	5.90		6.03		6.00		5.98	0.07	1.17
22	48	4.1	31	6.49	b	5.85		5.99		5.99	0.34	5.68
23	36	3.3	20	6.15		5.73	b	6.03		6.03	0.22	3.65
24	8	3.91	31	5.91	b	6.16		6.23		6.14	0.17	2.77
25	21	5.4	31	5.82	b	6.18		6.22		6.14	0.22	3.58
26	38	4.3	31	6.04		6.17		6.34		6.17	0.15	2.43
27	45	3.1	31	6.10		6.22		6.22		6.18	0.07	1.13
28	31	3.5	20	6.28		5.94	b	6.23		6.20	0.18	2.90
29	41	4.1	21	6.09		6.29		6.29		6.23	0.12	1.93
30	13	3.3	21	6.36		6.15		6.31		6.28	0.11	1.75
31	12	5.1	31	6.55		6.40		6.23		6.40	0.16	2.50
32	26	3.2	31	6.32		6.47		6.86	b	6.47	0.28	4.33
33	30	6.1	20	6.89		7.45	b	6.84		6.92	0.34	4.91
34	28	5.1	20	7.20	b	6.90		6.90		6.96	0.17	2.44
35	47	4.1	31	7.13	a	7.29	a	7.22	a	7.21	0.08	1.11
36	10	6.1	20	7.42	a	7.33	a	7.29	a	7.35	0.07	0.95
37	27	6.1	20	7.50	a	7.00	ab	8.00	ab	7.50	0.50	6.67
38	24	6.5	20	8.58	ab	7.50	ab	7.80	a	7.80 *	0.56	7.18
39	9	5.1	31	8.49	a	8.14	ab	8.71	ab	8.49 *	0.29	3.42

Mean	Interlab.std. deviation	
	abs.	rel.%
5.88	0.21	3.79

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 39
Percentage of non-tolerable lab means: 10.3


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN
Element:
Pb
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
27
28
29
30
31
35
36
37
38
39
40
41
42
43
44
45
45a
46
47
48
49
50
51
Evaluation acc. lab. code

Element: Pb
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	31	3.5	21	0.40	b	0.10		0.10		**0.10 ***	0.17	170.00
2	37	5.4	21	0.09	b	0.10		0.10		**0.10 ***	0.01	10.00
3	38	5.1	32	0.10		0.10		0.11	b	**0.10 ***	0.01	10.00
4	14	4.1	21	0.14		0.14		0.14		**0.14 ***	0.00	0.00
5	43	4.1	21	0.20		0.20		0.30	b	**0.20 ***	0.06	30.00
6	44	4.1	31	0.30	b	0.20		0.20		**0.20 ***	0.06	30.00
7	8a	3.31	31	0.40	b	0.30		0.30		**0.30**	0.06	20.00
8	26	3.2	31	0.30		0.30		0.30		**0.30**	0.00	0.00
9	39	5.4	21	0.30		0.30		0.30		**0.30**	0.00	0.00
10	42	4.1	21	0.24	b	0.39		0.54	b	**0.39**	0.15	38.46
11	40	5.5	21	0.40		0.50	b	0.40		**0.40**	0.06	15.00
12	50	4.1	31	0.40		0.40		0.30	b	**0.40**	0.06	15.00
13	41	4.1	21	0.50		0.50		0.00		**0.50**	0.00	0.00
14	36	3.3	20	0.60		0.60		0.50	b	**0.60 ***	0.06	10.00
15	13	3.3	21	0.80		0.80		0.70	b	**0.80 ***	0.06	7.50
16	25	5.1	21	0.84		0.80	b	0.88	b	**0.84 ***	0.04	4.76
17	24	6.5	20	1.05	a	1.05	a	1.15	ab	**1.05 ***	0.06	5.71
18	9	5.1	31	5.70	ab	7.20	ab	6.10	a	**6.10 ***	0.78	12.79

Mean	Interlab.std. deviation	
	abs.	rel.%
0.40	**0.09**	**21.07**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **18**
Percentage of non-tolerable lab means: **61.1**

Element: Pb
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**31**	3.5	21	0.20		0.20		0.30	b	**0.20 ***	0.06	30.00
2	**37**	5.4	21	0.27		0.25	b	0.27		**0.27 ***	0.01	3.70
3	**38**	5.1	32	0.28	b	0.30		0.30		**0.30 ***	0.01	3.33
4	**47**	4.1	31	0.30		0.30		0.30		**0.30 ***	0.00	0.00
5	**14**	4.1	21	0.39		0.38	b	0.45	b	**0.39 ***	0.04	10.26
6	**42**	4.1	21	0.47	b	0.50		0.54	b	**0.50**	0.04	8.00
7	**43**	4.1	21	0.50		0.50		0.40	b	**0.50**	0.06	12.00
8	**44**	4.1	31	0.50		0.40	b	0.50		**0.50**	0.06	12.00
9	**8a**	3.31	31	0.60		0.60		0.50	b	**0.60**	0.06	10.00
10	**26**	3.2	31	0.60		0.60		0.60		**0.60**	0.00	0.00
11	**41**	4.1	21	0.50	b	0.60		1.10	b	**0.60**	0.32	53.33
12	**50**	4.1	31	0.60		0.70	b	0.60		**0.60**	0.06	10.00
13	**39**	5.4	21	0.70		0.60	b	0.70		**0.70**	0.06	8.57
14	**40**	5.5	21	0.70		0.70		0.60	b	**0.70**	0.06	8.57
15	**36**	3.3	20	0.70	b	0.90	b	0.80		**0.80 ***	0.10	12.50
16	**24**	6.5	20	0.95	b	0.90		0.88	b	**0.90 ***	0.04	4.44
17	**25**	5.1	21	1.00		0.87	b	1.14	b	**1.00 ***	0.14	14.00
18	**13**	3.3	21	1.80	ab	1.70	a	1.60	ab	**1.70 ***	0.10	5.88
19	**9**	5.1	31	6.10	ab	6.30	a	6.30	a	**6.30 ***	0.12	1.90

Mean	Interlab.std. deviation	
	abs.	rel.%
0.61	**0.07**	**10.97**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **19**
Percentage of non-tolerable lab means: **52.6**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Pb
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	24	6.5	20	2.14	a	2.45	a	2.01	a	2.16 *	0.23	10.65
2	4a	2	41	3.80	a	3.40	a	3.40	a	3.49	0.23	6.59
3	31	3.5	21	4.40		4.10		4.20		4.23	0.15	3.55
4	38	5.1	32	5.20	b	4.30		4.30		4.39	0.52	11.85
5	4	2	40	3.80	b	4.80	b	4.40		4.40	0.50	11.36
6	37	5.4	21	4.35		4.44		4.40		4.40	0.05	1.14
7	17	5.4	31	4.10		4.50		4.50		4.41	0.23	5.22
8	47	4.1	31	4.40		4.60		4.70		4.57	0.15	3.28
9	25	5.1	21	4.60		4.81		4.34		4.60	0.24	5.22
10	41	4.1	21	5.40	b	4.90		4.30	b	4.90	0.55	11.22
11	44	4.1	31	5.20		4.90		4.60		4.90	0.30	6.12
12	43	4.1	21	5.00		4.90		4.90		4.93	0.06	1.22
13	40	5.5	21	5.00		5.50	b	4.70		5.00	0.40	8.00
14	14	4.1	21	5.06		5.00		5.16		5.07	0.08	1.58
15	26	3.2	31	5.10		5.10		5.10		5.10	0.00	0.00
16	50	4.1	31	5.50		5.20		4.70	b	5.20	0.40	7.69
17	8a	3.31	31	6.10	b	5.20		5.10		5.24	0.55	10.50
18	42	4.1	21	6.20	b	4.90	b	5.50		5.50	0.65	11.82
19	39	5.4	21	5.60		5.64		5.36		5.53	0.15	2.71
20	36	3.3	20	5.40		6.60	b	5.60		5.60	0.64	11.43
21	9	5.1	31	8.50	a	9.20	ab	8.70	a	8.70 *	0.36	4.14
22	13	3.3	21	9.90	a	9.90	a	9.20	ab	9.81 *	0.40	4.08

Mean	Interlab.std. deviation	
	abs.	rel.%
4.89	0.31	6.33

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 22
Percentage of non-tolerable lab means: 13.6

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Pb
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	4a	2	41	0.50	a	0.70	ab	0.30	ab	0.50 *	0.20	40.00
2	37	5.4	21	0.96	b	0.97		0.97		0.97 *	0.01	1.03
3	38	5.1	32	1.03	b	1.07	b	1.05		1.05	0.02	1.90
4	31	3.5	21	1.10		1.10		1.10		1.10	0.00	0.00
5	8a	3.31	31	1.50	b	1.30		1.30		1.30	0.12	9.23
6	44	4.1	31	1.30		1.30		1.50	b	1.30	0.12	9.23
7	4	2	40	0.00		0.00		1.40		1.40		0.00
8	26	3.2	31	1.50	b	1.40		1.40		1.40	0.06	4.29
9	43	4.1	21	1.40		1.30	b	1.40		1.40	0.06	4.29
10	50	4.1	31	1.40		1.40		1.30	b	1.40	0.06	4.29
11	14	4.1	21	1.48		1.46	b	1.54	b	1.48	0.04	2.70
12	42	4.1	21	1.35	b	1.51	b	1.48		1.48	0.09	6.08
13	13	3.3	21	1.50		1.50		1.40	b	1.50	0.06	4.00
14	40	5.5	21	1.60	b	1.50		1.30	b	1.50	0.15	10.00
15	39	5.4	21	1.60		1.60		1.60		1.60	0.00	0.00
16	41	4.1	21	1.60		1.60		1.60		1.60	0.00	0.00
17	47	4.1	31	1.20	b	1.60		1.60		1.60	0.23	14.38
18	25	5.1	21	1.90		2.02	b	1.71	b	1.90 *	0.16	8.42
19	24	6.5	20	2.53	ab	2.75	a	2.90	ab	2.75 *	0.19	6.91
20	36	3.3	20	3.10	ab	3.70	ab	3.20	a	3.20 *	0.32	10.00
21	9	5.1	31	6.30	ab	6.20	a	6.00	ab	6.20 *	0.15	2.42

Mean	Interlab.std. deviation	
	abs.	rel.%
1.46	0.10	6.63

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	21
	Percentage of non-tolerable lab means:	28.6
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	1.40

Element: Pb
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

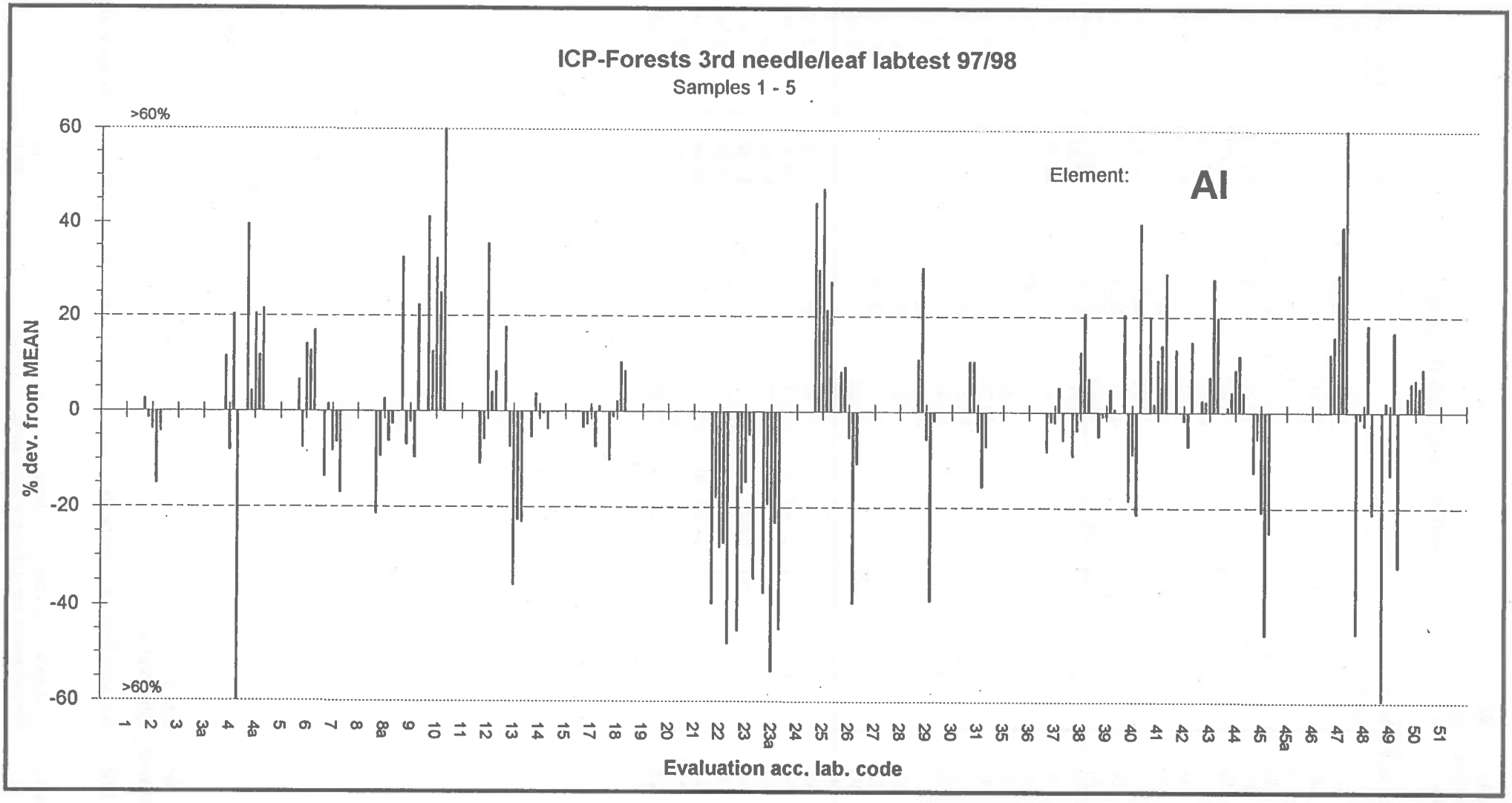
No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	31	3.5	21	0.40		0.40		0.60	b	0.40 *	0.12	30.00
2	47	4.1	31	0.40	b	0.50		0.60	b	0.50 *	0.10	20.00
3	37	5.4	21	0.52	b	0.50	b	0.51		0.51 *	0.01	1.96
4	43	4.1	21	0.60		0.60		0.60		0.60 *	0.00	0.00
5	38	5.1	32	0.63		0.63		0.63		0.63 *	0.00	0.00
6	14	4.1	21	0.65		0.59	b	0.71	b	0.65 *	0.06	9.23
7	44	4.1	31	0.70		0.90	b	0.70		0.70	0.12	17.14
8	40	5.5	21	0.80		0.90	b	0.70	b	0.80	0.10	12.50
9	42	4.1	21	0.83		1.04	b	0.83		0.83	0.12	14.46
10	8a	3.31	31	0.90		0.90		0.90		0.90	0.00	0.00
11	39	5.4	21	0.90		0.90		0.80	b	0.90	0.06	6.67
12	50	4.1	31	0.90		0.90		0.80	b	0.90	0.06	6.67
13	41	4.1	21	1.00	b	1.10		1.10		1.10	0.06	5.45
14	13	3.3	21	1.30		1.30		1.30		1.30 *	0.00	0.00
15	25	5.1	21	1.33		1.28	b	1.51	b	1.33 *	0.12	9.02
16	26	3.2	31	1.40		1.30	b	1.80	b	1.40 *	0.26	18.57
17	24	6.5	20	1.44	b	1.60	b	1.46		1.46 *	0.09	6.16
18	36	3.3	20	2.50	ab	2.30	ab	2.40	a	2.40 *	0.10	4.17
19	9	5.1	31	6.90	a	6.10	ab	7.60	ab	6.90 *	0.75	10.87

Mean	Interlab.std. deviation	
	abs.	rel.%
0.96	0.11	9.10

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 19
Percentage of non-tolerable lab means: 63.2


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
Al
>60%
>60%
60
40
20
0
-20
-40
-60
% dev. from MEAN
1
2
3
3a
4
4a
5
6
7
8
8a
9
10
11
12
13
14
15
17
18
19
20
21
22
23
23a
24
25
26
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29
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42
43
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45a
46
47
48
49
50
51
Evaluation acc. lab. code

Element: Al
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	49	4.1	31	16.30	a	23.50	ab	15.30	a	16.36	*	4.47	27.32
2	48	4.1	31	27.00	a	28.40	a	26.80	a	27.40	*	0.87	3.18
3	23	3.3	31	28.90	a	27.00	a	27.30	a	27.71	*	1.02	3.68
4	22	0	0	30.00	a	30.00	a	40.00	ab	30.56	*	5.77	18.88
5	23a	6.1	31	30.20	a	32.70	a	31.80	a	31.69	*	1.27	4.01
6	8a	3.31	31	38.40		40.20		40.50		39.79	*	1.14	2.87
7	7	3.2	31	43.50		43.60		44.10		43.73		0.32	0.73
8	45	3.1	31	43.60		44.60		44.60		44.27		0.58	1.31
9	12	5.1	31	45.60		44.60		45.10		45.10		0.50	1.11
10	18	3.8	31	45.50		46.90		42.70	b	45.50		2.14	4.70
11	38	4.3	31	50.10	b	45.70		45.20		46.01		2.70	5.87
12	37	5.4	32	46.50		46.20		46.70		46.47		0.25	0.54
13	14	4.1	31	48.20		48.80		46.20	b	47.94		1.36	2.84
14	39	5.4	31	49.20		47.40		47.70		48.10		0.96	2.00
15	17	5.4	31	49.20		49.40		48.40		49.00		0.53	1.08
16	44	4.1	31	57.00	b	51.30		47.90	b	51.30		4.60	8.97
17	43	4.1	31	54.00	b	52.00		51.00		52.06		1.53	2.94
18	2	5.2	31	53.10		52.20		50.00	b	52.09		1.59	3.05
19	50	4.1	31	53.60		51.40		52.10		52.31		1.12	2.14
20	6	5.6	31	54.60		53.50		54.10		54.07		0.55	1.02
21	26	3.2	31	54.80		54.90		55.20		54.97		0.21	0.38
22	31	3.5	20	117.60	b	53.70	b	56.10		56.10		36.22	64.56
23	29	5.1	31	56.00		57.00		56.00		56.33		0.58	1.03
24	47	4.1	31	61.30	b	56.90		55.60		56.90		2.99	5.25
25	42	4.1	31	57.30		61.40	b	56.30		57.36		2.70	4.71
26	13	3.3	21	57.40	b	62.30	b	59.70		59.70		2.45	4.10
27	41	4.1	31	61.00		59.30	b	62.00		60.94	*	1.37	2.25
28	40	5.5	31	62.00		61.50		59.00	b	61.19	*	1.61	2.63
29	9	5.1	31	67.50		63.90	b	68.10		67.24	*	2.27	3.38
30	4a	2	41	66.00	ab	72.00	a	71.00	a	70.94	*	3.21	4.52
31	10	6.4	20	67.90	ab	74.10	ab	71.70	a	71.70	*	3.13	4.37
32	25	5.1	31	73.50	a	73.30	a	72.80	a	73.20	*	0.36	0.49

Mean	Interlab.std. deviation	
	abs.	rel.%
50.74	2.82	6.12

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation: Data sets >0 or >detection limit: 32
Percentage of non-tolerable lab means: 37.5

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Al
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	23a	6.1	31	232.10	a	242.20	ab	235.90	a	235.90		5.10	2.16
2	40	5.5	31	237.00	a	239.10	a	240.00	a	238.70		1.54	0.65
3	22	0	0	240.00	a	230.00	ab	250.00	ab	240.00		10.00	4.17
4	23	3.3	31	240.70	a	245.20	a	243.20	a	243.03		2.25	0.93
5	8a	3.31	31	263.00		265.00		272.00	b	265.45		4.73	1.78
6	6	5.6	31	269.40		271.70		271.00		270.70		1.18	0.44
7	13	3.3	21	277.60	b	271.40		252.50	b	271.40		13.07	4.82
8	9	5.1	31	274.70		268.70		272.90		272.35		3.08	1.13
9	12	5.1	31	276.00		274.50		276.90		275.80		1.21	0.44
10	45	3.1	31	280.00		274.00		276.00		276.45		3.06	1.11
11	38	4.3	31	280.00		291.00	b	280.00		281.45		6.35	2.26
12	17	5.4	31	282.70		292.20	b	284.60		285.10		5.03	1.76
13	37	5.4	32	283.00		287.00		293.00	b	287.00		5.03	1.75
14	48	4.1	31	288.00		288.40		289.60		288.67		0.83	0.29
15	2	5.2	31	289.70		275.60	b	290.70		288.75		8.44	2.92
16	18	3.8	31	288.90		291.90		287.60		289.47		2.21	0.76
17	39	5.4	31	290.20		291.80		288.30		290.10		1.75	0.60
18	42	4.1	31	289.70		295.70		292.70		292.70		3.00	1.02
19	7	3.2	31	297.40		299.20		296.70		297.77		1.29	0.43
20	41	4.1	31	297.00		297.00		303.00	b	298.45		3.46	1.16
21	49	4.1	31	299.30		299.70		298.80		299.27		0.45	0.15
22	43	4.1	31	303.00		300.00		296.00		300.00		3.51	1.17
23	14	4.1	31	304.30		309.00	b	297.00	b	304.30		6.05	1.99
24	4a	2	41	306.00		308.00		288.00	b	305.55		11.02	3.61
25	44	4.1	31	326.50	b	279.30	b	305.60		305.60		23.65	7.74
26	50	4.1	31	309.00		313.90		309.80		310.85		2.63	0.85
27	26	3.2	31	325.80	b	320.80		316.70		320.80		4.56	1.42
28	31	3.5	20	325.50		322.90		324.50		324.30		1.31	0.40
29	4	2	40	297.00	b	327.00		331.00		327.00		18.58	5.68
30	10	6.4	20	330.00		329.50		329.70		329.73		0.25	0.08
31	47	4.1	31	341.30	a	340.90	a	327.70	ab	339.65		7.74	2.28
32	25	5.1	31	375.70	ab	381.30	a	385.60	a	381.30	*	4.96	1.30
33	29	5.1	31	379.00	a	383.00	a	385.00	a	382.55	*	3.06	0.80

Mean	Interlab.std. deviation	
	abs.	rel.%
293.20	5.16	1.76

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **33**
Percentage of non-tolerable lab means: **6.1**

Element: Al
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	23a	6.1	31	66.10	a	64.40	a	65.10	a	65.20 *	0.85	1.30
2	13	3.3	21	89.30	a	94.70	a	89.00	a	90.71 *	3.21	3.54
3	22	0	0	100.00	a	110.00	ab	100.00	a	101.56 *	5.77	5.68
4	45	3.1	31	112.00		115.00		108.00		111.94 *	3.51	3.14
5	23	3.3	31	121.50		123.00		113.40	b	120.69	5.16	4.28
6	49	4.1	31	122.90		115.80	b	130.00	b	122.90	7.10	5.78
7	40	5.5	31	129.00		123.20		138.20	b	129.00	7.56	5.86
8	7	3.2	31	129.00		130.30		130.30		129.87	0.75	0.58
9	4	2	40	177.00	b	113.00	b	130.00		130.00	33.15	25.50
10	29	5.1	31	134.00		129.00		136.00		133.44	3.61	2.71
11	26	3.2	31	128.00	b	134.70		136.30		133.94	4.40	3.29
12	31	3.5	20	142.60	b	135.90		132.30		135.90	5.23	3.85
13	2	5.2	31	115.10	b	156.00	b	136.30		136.30	20.45	15.00
14	48	4.1	31	132.90		139.30		139.20		137.69	3.67	2.67
15	9	5.1	31	138.30		141.20		135.70		138.40	2.75	1.99
16	37	5.4	32	136.00		145.00	b	138.00		138.56	4.73	3.41
17	42	4.1	31	136.10		139.10		149.20	b	139.16	6.86	4.93
18	14	4.1	31	140.20		149.30	b	134.50		140.20	7.46	5.32
19	39	5.4	31	141.00		139.70		140.50		140.40	0.66	0.47
20	17	5.4	31	141.50		151.90	b	141.50		143.06	6.00	4.19
21	18	3.8	31	140.80		145.00		153.60	b	145.00	6.52	4.50
22	8a	3.31	31	145.00		152.00	b	143.00		145.56	4.73	3.25
23	50	4.1	31	156.00		148.30		151.40		151.41	3.87	2.56
24	43	4.1	31	150.00		154.00		153.00		152.33	2.08	1.37
25	44	4.1	31	164.60	b	151.10		154.30		154.30	7.05	4.57
26	41	4.1	31	157.00		156.00		159.00		157.33	1.53	0.97
27	38	4.3	31	158.00		159.00		162.00		159.67	2.08	1.30
28	6	5.6	31	163.10		160.40		161.80		161.77	1.35	0.83
29	4a	2	41	173.00		172.00		154.00	b	170.94 *	10.69	6.25
30	47	4.1	31	191.90	ab	182.20	a	180.80	a	183.06 *	6.05	3.30
31	10	6.4	20	185.60	a	206.50	ab	186.70	a	187.71 *	11.76	6.26
32	12	5.1	31	172.80	ab	213.20	ab	192.10	a	192.10 *	20.21	10.52
33	25	5.1	31	203.50	a	213.50	a	208.90	a	208.90 *	5.01	2.40

Mean	Interlab.std. deviation	
	abs.	rel.%
141.80	6.54	4.59

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 33
Percentage of non-tolerable lab means: 27.3

Element: Al
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes pretreatm.	determ.	Replications						Lab.mean		Lab.standard deviation abs.	rel.%
1	45	3.1	31	234.00	a	236.00	a	243.00	a	237.67	*	4.73	1.99
2	26	3.2	31	301.80	ab	266.70	a	253.50	ab	266.70	*	24.96	9.36
3	29	5.1	31	273.00	a	265.00	a	268.00	a	268.67	*	4.04	1.50
4	22	0	0	330.00		320.00		310.00		320.00	*	10.00	3.13
5	23a	6.1	31	321.70	b	347.40		338.40		338.40	*	13.04	3.85
6	13	3.3	21	340.90		328.60		348.90		340.90	*	10.23	3.00
7	40	5.5	31	360.00	b	343.60		342.70		346.82	*	9.74	2.81
8	31	3.5	20	346.80	b	377.50		374.20		372.18		16.85	4.53
9	2	5.2	31	378.10		378.10		355.30	b	374.43		13.16	3.51
10	9	5.1	31	396.50		408.80		393.50		398.67		8.11	2.03
11	17	5.4	31	393.00	b	422.00	b	409.00		409.00		14.53	3.55
12	42	4.1	31	410.70		406.70		413.70		410.37		3.51	0.86
13	7	3.2	31	413.00		410.90		413.90		412.60		1.54	0.37
14	8a	3.31	31	415.00		420.00		362.00	b	413.83		32.14	7.77
15	23	3.3	31	419.80		441.00	b	410.50		419.80		15.63	3.72
16	14	4.1	31	439.50		433.20		454.20	b	440.02		10.78	2.45
17	12	5.1	31	461.00		441.40	b	465.50		459.58		12.81	2.79
18	39	5.4	31	465.90		455.60		466.70		462.73		6.19	1.34
19	37	5.4	32	471.00		465.00		456.00		464.33		7.55	1.63
20	50	4.1	31	463.50		457.90		474.20		464.37		8.28	1.78
21	18	3.8	31	487.10		505.40	b	463.80	b	487.10		20.85	4.28
22	44	4.1	31	493.50		471.50	b	518.20	b	493.50		23.36	4.73
23	4a	2	41	496.00		499.00		481.00	b	493.83		9.64	1.95
24	6	5.6	31	502.10		493.50		496.90		497.50		4.33	0.87
25	41	4.1	31	501.00		506.00		503.00		503.33		2.52	0.50
26	49	4.1	31	515.80		517.90		513.60		515.77		2.15	0.42
27	48	4.1	31	522.60		513.60		536.80	b	522.60		11.70	2.24
28	4	2	40	573.00	b	532.00		496.00	b	532.00	*	38.53	7.24
29	38	4.3	31	535.00		535.00		531.00		533.67	*	2.31	0.43
30	25	5.1	31	530.70		538.20		540.40		536.43	*	5.09	0.95
31	10	6.4	20	541.60		552.00		573.00	b	552.00	*	16.00	2.90
32	43	4.1	31	587.00	b	566.00		531.00	b	566.00	*	28.29	5.00
33	47	4.1	31	609.90	a	614.50	a	622.70	a	615.70	*	6.48	1.05

Mean	Interlab.std. deviation abs.	rel.%
441.80	12.09	2.86

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	33
	Percentage of non-tolerable lab means:	39.4
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	427.90

Element: Al
Dimension: µg/g
Sample: 5 BEECH LEAVES (Slovenia)

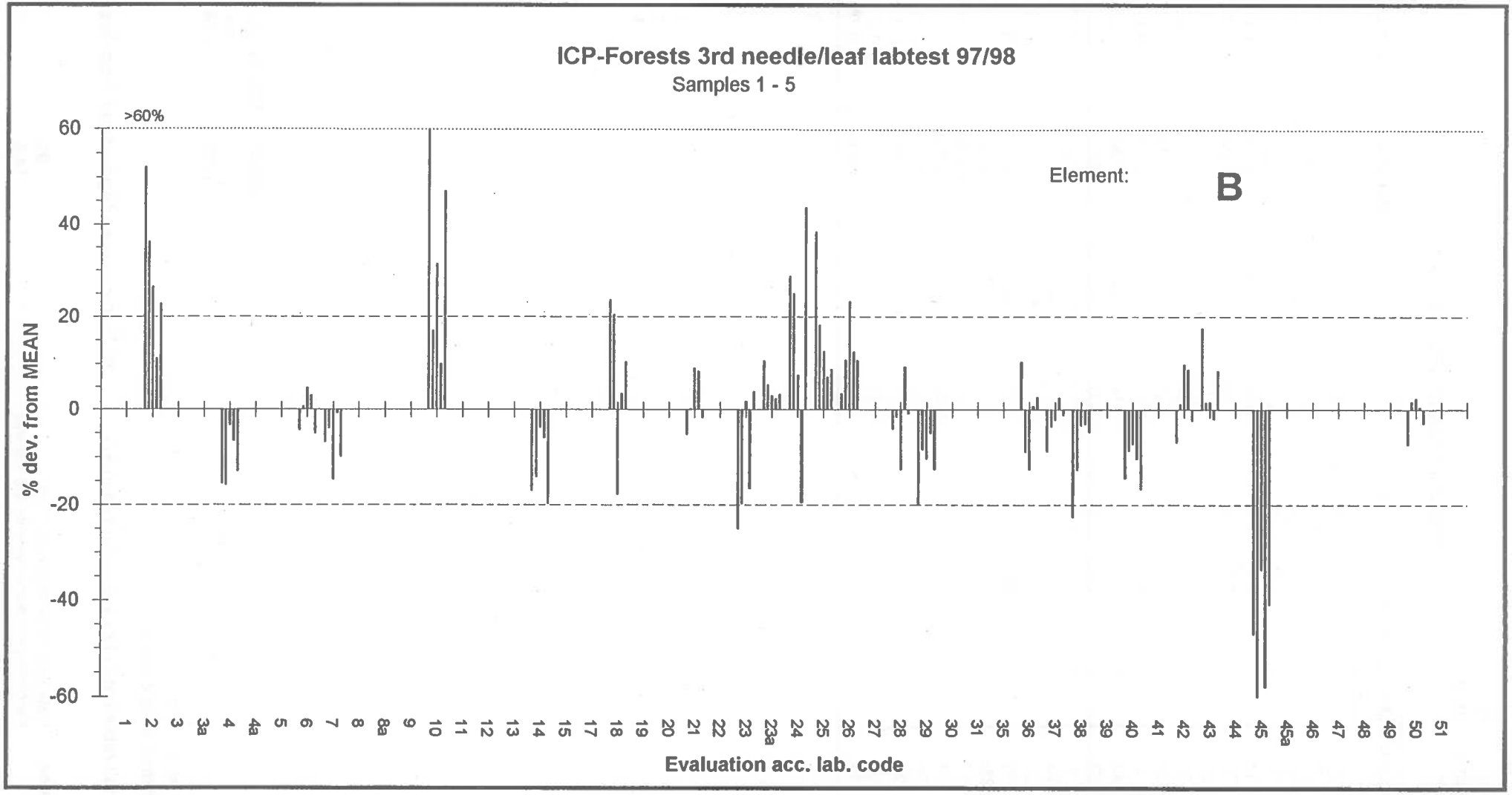
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	4	2	40	21.00	a	12.60	ab	88.00	ab	21.00	*	41.32	196.76
2	22	0	0	40.00	ab	30.00	a	30.00	a	31.11	*	5.77	18.55
3	23a	6.1	31	32.70	a	32.60	a	33.60	a	32.97	*	0.55	1.67
4	23	3.3	31	44.70	b	36.40	b	39.20		39.20	*	4.22	10.77
5	49	4.1	31	36.20	b	44.10	b	40.70		40.70	*	3.96	9.73
6	45	3.1	31	45.20		45.20		44.10		44.83	*	0.64	1.43
7	13	3.3	21	44.30		48.10		45.90		46.10	*	1.91	4.14
8	48	4.1	31	42.80	b	49.30		47.30		47.19	*	3.33	7.06
9	7	3.2	31	49.10		50.70		49.20		49.67		0.90	1.81
10	26	3.2	31	54.90		52.00		53.30		53.40		1.45	2.72
11	31	3.5	20	53.20		57.20		56.20		55.59		2.08	3.74
12	37	5.4	32	57.60		55.30		56.50		56.47		1.15	2.04
13	2	5.2	31	56.30		58.20		57.80		57.43		1.00	1.74
14	14	4.1	31	57.80		62.10	b	53.20	b	57.80		4.45	7.70
15	8a	3.31	31	54.00	b	60.30		58.60		58.34		3.26	5.59
16	29	5.1	31	57.50		61.00		58.00		58.83		1.89	3.21
17	39	5.4	31	60.30		60.50		60.70		60.50		0.20	0.33
18	17	5.4	31	60.30		61.90		60.20		60.80		0.95	1.56
19	44	4.1	31	61.90		69.30	b	60.90		62.51		4.59	7.34
20	38	4.3	31	63.10		64.10		65.60		64.27		1.26	1.96
21	12	5.1	31	65.70		66.50		62.80		65.00		1.95	3.00
22	18	3.8	31	75.40	b	58.80	b	65.10		65.10		8.38	12.87
23	50	4.1	31	64.70		66.00		65.80		65.50		0.70	1.07
24	42	4.1	31	70.50		69.50		66.40	b	68.89		2.14	3.11
25	6	5.6	31	70.90		69.80		70.10		70.27		0.57	0.81
26	43	4.1	31	72.00		71.00		73.00		72.00		1.00	1.39
27	4a	2	41	72.00		73.00		74.00		73.00	*	1.00	1.37
28	9	5.1	31	73.40		73.20		73.80		73.47	*	0.31	0.42
29	25	5.1	31	76.20		78.50		74.90		76.53	*	1.82	2.38
30	41	4.1	31	79.00		78.00		76.00		77.67	*	1.53	1.97
31	40	5.5	31	89.00	b	84.10		79.60	b	84.10	*	4.70	5.59
32	47	4.1	31	93.80	a	98.80	ab	96.00	a	96.01	*	2.51	2.61
33	10	6.4	20	103.90	ab	95.70	ab	100.40	a	100.40	*	4.11	4.09

Mean	Interlab.std. deviation	
	abs.	rel.%
60.04	3.50	10.02

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 33
Percentage of non-tolerable lab means: 45.5


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element:
B
>60%
60
40
20
0
-20
-40
-60
% dev. from MEAN
1 2 3 3a 4 4a 5 6 7 8 8a 9 10 11 12 13 14 15 17 18 19 20 21 22 23 23a 24 25 26 27 28 29 30 31 35 36 37 38 39 40 41 42 43 44 45 45a 46 47 48 49 50 51
Evaluation acc. lab. code

Element: B
Dimension: µg/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	45	3.1	31	4.46	a	4.58	a	4.58	a	**4.54**	*	0.07	1.54
2	23	3.3	31	6.28		6.39		6.82	b	**6.42**	*	0.29	4.52
3	38	5.1	32	6.66		6.63		6.60		**6.63**	*	0.03	0.45
4	29	5.1	31	6.81		6.83		6.97		**6.87**		0.09	1.31
5	14	4.1	31	7.11		6.80	b	7.70	b	**7.11**		0.46	6.47
6	4	5.1	31	7.80	b	7.20		7.10		**7.24**		0.38	5.25
7	40	5.5	31	7.33		7.43		7.26		**7.34**		0.09	1.23
8	37	6.1	32	7.91		7.83		7.73		**7.82**		0.09	1.15
9	50	4.1	31	8.94	b	6.77	b	7.94		**7.94**		1.09	13.73
10	7	6	57	8.05		7.95		7.94		**7.98**		0.06	0.75
11	42	4.1	31	8.05		7.95		7.95		**7.98**		0.06	0.75
12	21	5.4	31	9.02	b	8.12		7.48	b	**8.12**		0.77	9.48
13	6	5.6	31	8.20		8.19		8.20		**8.20**		0.01	0.12
14	28	6	58	8.72	b	8.05		8.22		**8.22**		0.35	4.26
15	26	3.2	31	8.89		8.64	b	9.11		**8.89**		0.24	2.70
16	36	6.1	58	9.53		8.47	b	9.61		**9.48**		0.64	6.75
17	23a	6.1	31	9.60		9.51		9.38		**9.50**		0.11	1.16
18	43	4.1	31	11.00	b	10.00		10.00		**10.09**		0.58	5.75
19	18	6.5	31	10.62		10.81		9.91	b	**10.62**	*	0.47	4.43
20	24	6.5	57	11.06		11.38	b	10.78	b	**11.06**	*	0.30	2.71
21	25	5.1	31	11.97	a	11.96	a	11.15	ab	**11.88**	*	0.47	3.96
22	2	5.2	31	14.78	ab	12.91	a	13.05	a	**13.07**	*	1.04	7.96
23	10	6.1	50	19.22	ab	18.09	a	17.94	a	**18.10**	*	0.70	3.87

Mean	Interlab.std. deviation	
	abs.	rel.%
8.58	**0.36**	**3.93**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**23**
	Percentage of non-tolerable lab means:	**34.8**

Element: B
Dimension: µg/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**45**	3.1	31	4.75	a	4.85	a	4.52	a	**4.71 ***	0.17	3.61
2	**23**	3.3	31	9.54		9.60		8.03	b	**9.46**	0.89	9.41
3	**4**	5.1	31	7.20	b	10.10		10.00		**9.94**	1.65	16.60
4	**14**	4.1	31	10.13		9.90		11.30	b	**10.13**	0.75	7.40
5	**38**	5.1	32	10.10		10.30		10.60		**10.31**	0.25	2.42
6	**36**	6.1	58	13.34	b	10.26	b	10.76		**10.76**	1.65	15.33
7	**40**	5.5	31	10.29	b	11.05		10.78		**10.78**	0.39	3.62
8	**29**	5.1	31	10.80		11.10		10.60		**10.81**	0.25	2.31
9	**7**	6	57	11.58		11.18		11.27		**11.34**	0.21	1.85
10	**37**	6.1	32	11.30		11.39		11.46		**11.38**	0.08	0.70
11	**28**	6	58	11.32		11.92		11.62		**11.62**	0.30	2.58
12	**21**	5.4	31	11.70		12.08		11.78		**11.85**	0.20	1.69
13	**6**	5.6	31	11.96		11.82		11.94		**11.91**	0.08	0.67
14	**42**	4.1	31	12.07		12.07		11.06	b	**11.96**	0.58	4.85
15	**43**	4.1	31	12.00		12.00		12.00		**12.00**	0.00	0.00
16	**50**	4.1	31	12.65	b	10.36	b	12.03		**12.03**	1.18	9.81
17	**23a**	6.1	31	12.22		12.46		12.89		**12.46**	0.34	2.73
18	**26**	3.2	31	13.00		16.00	b	13.00		**13.11**	1.73	13.20
19	**10**	6.1	50	13.71		14.99	b	13.74		**13.84**	0.73	5.27
20	**25**	5.1	31	13.98		14.35		13.62		**13.98**	0.37	2.65
21	**18**	6.5	31	13.83		14.24		14.99	b	**14.24 ***	0.59	4.14
22	**24**	6.5	57	14.79	a	15.53	ab	14.22	ab	**14.79 ***	0.66	4.46
23	**2**	5.2	31	17.04	ab	14.81	ab	16.09	a	**16.09 ***	1.12	6.96

Mean	Interlab.std. deviation	
	abs.	rel.%
11.82	**0.62**	**5.32**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **23**
Percentage of non-tolerable lab means: **17.4**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: B
Dimension: µg/g
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	45	3.1	31	16.20	a	15.20	a	15.50	a	**15.63**	*	0.51	3.26
2	18	6.5	31	19.28		23.39	b	18.91		**19.37**		2.49	12.85
3	7	6	57	20.18		20.07		20.12		**20.12**		0.06	0.30
4	28	6	58	19.13	b	20.62		22.12	b	**20.62**		1.50	7.27
5	36	6.1	58	20.14		20.54		21.30		**20.62**		0.59	2.86
6	29	5.1	31	21.00		21.00		21.40		**21.13**		0.23	1.09
7	40	5.5	31	22.20		22.10		21.12		**21.87**		0.60	2.74
8	14	4.1	31	22.85		23.10		21.80	b	**22.70**		0.69	3.04
9	4	5.1	31	23.60		22.10		22.80		**22.80**		0.75	3.29
10	38	5.1	32	22.50		22.80		23.10		**22.80**		0.30	1.32
11	37	6.1	32	22.94		23.07		23.16		**23.06**		0.11	0.48
12	43	4.1	31	23.00	b	27.00	b	24.00		**24.00**		2.08	8.67
13	23	3.3	31	23.11	b	25.81	b	24.05		**24.05**		1.37	5.70
14	50	4.1	31	25.78	b	23.15	b	24.19		**24.19**		1.32	5.46
15	23a	6.1	31	24.65		24.23		24.12		**24.33**		0.28	1.15
16	6	5.6	31	24.48		24.90		24.79		**24.72**		0.22	0.89
17	24	6.5	57	26.18		25.40		24.44	b	**25.40**		0.87	3.43
18	21	5.4	31	25.82		26.00		25.46		**25.76**		0.27	1.05
19	42	4.1	31	26.21		26.21		25.20		**25.93**		0.58	2.24
20	25	5.1	31	26.11		27.15		26.54		**26.60**		0.52	1.95
21	26	3.2	31	27.31	ab	33.24	ab	29.11	a	**29.11**	*	3.04	10.44
22	2	5.2	31	27.15	ab	29.88	a	31.50	ab	**29.88**	*	2.20	7.36
23	10	6.1	50	31.21	a	30.62	a	31.29	a	**31.04**	*	0.37	1.19

Mean	Interlab.std. deviation	
	abs.	rel.%
23.61	**0.91**	**3.83**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **23**
Percentage of non-tolerable lab means: **17.4**

Element: B
Dimension: µg/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes pretreatm.	determ.	Replications						Lab.mean	Lab.standard deviation abs.	rel.%
1	45	3.1	31	26.30	a	28.40	ab	26.80	a	26.83 *	1.10	4.10
2	24	6.5	57	53.59	ab	51.48	a	49.32	ab	51.48	2.14	4.16
3	23	3.3	31	48.98	ab	53.30	a	54.40	a	53.30	2.86	5.37
4	40	5.5	31	57.76		56.34		57.46		57.33	0.75	1.31
5	4	5.1	31	61.10	b	55.60	b	59.70		59.70	2.86	4.79
6	14	4.1	31	60.10		59.50		61.20		60.10	0.86	1.43
7	29	5.1	31	58.90	b	60.70		61.20		60.67	1.21	1.99
8	38	5.1	32	60.80	b	62.00		63.50	b	62.00	1.35	2.18
9	43	4.1	31	61.00	b	63.00		63.00		62.72	1.15	1.83
10	7	6	57	63.64		63.31		63.56		63.50	0.17	0.27
11	50	4.1	31	64.10		64.00		67.15	b	64.33	1.79	2.78
12	36	6.1	58	64.48		62.40	b	66.56	b	64.48	2.08	3.23
13	23a	6.1	31	65.41		65.72		65.38		65.50	0.19	0.29
14	37	6.1	32	65.10		65.50		66.30		65.58	0.61	0.93
15	6	5.6	31	66.13		65.83		65.91		65.96	0.16	0.24
16	18	6.5	31	51.17	b	66.50		66.50		66.22	8.85	13.36
17	25	5.1	31	68.54		68.02		70.73	b	68.56	1.44	2.10
18	21	5.4	31	69.62		69.60		68.44		69.33	0.68	0.98
19	42	4.1	31	71.29	b	69.28		69.28		69.56	1.16	1.67
20	28	6	58	69.69		69.94		70.20		69.94	0.26	0.37
21	10	6.1	50	68.16	b	70.62		70.72		70.39	1.45	2.06
22	2	5.2	31	70.58		71.06		72.99	b	71.10	1.28	1.80
23	26	3.2	31	72.13		72.23		71.79		72.05	0.23	0.32

Mean	Interlab.std. deviation abs.	rel.%
63.99	1.51	2.50

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:

Data sets >0 or >detection limit:	23
Percentage of non-tolerable lab means:	4.3
Mean of 2nd Needle/Leaf Test 95/96 sample 3:	59.41

ICP-Forests 3rd needle/leaf labtest 97/98

Element: B
Dimension: µg/g
Sample: 5 **BEECH LEAVES (Slovenia)**

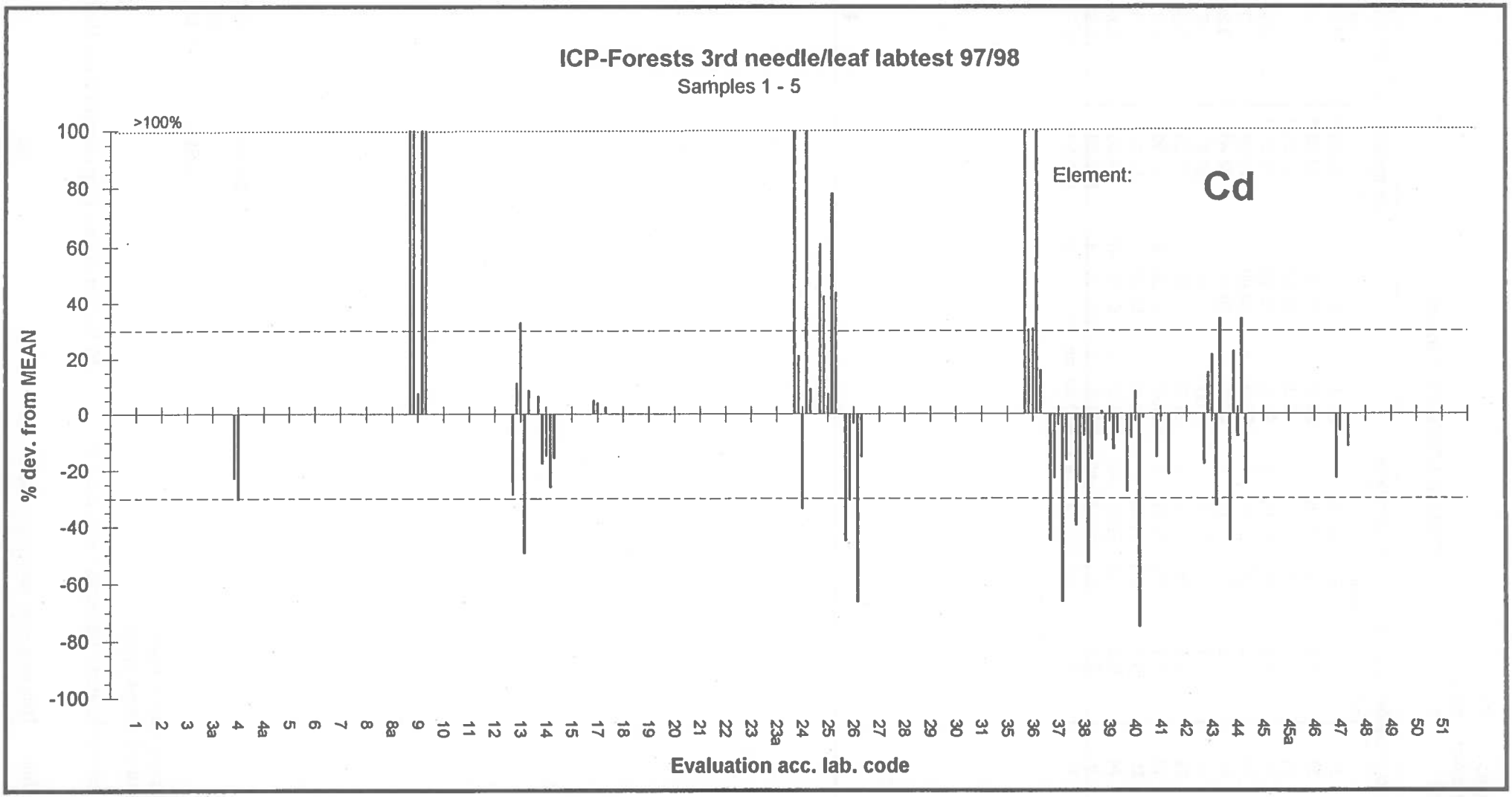
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	45	3.1	31	10.00	a	10.60	a	10.40	a	10.33	*	0.31	3.00
2	14	4.1	31	14.41		14.10		13.40	b	14.03		0.52	3.71
3	40	5.5	31	14.24		14.68		14.78		14.57		0.29	1.99
4	4	5.1	31	16.00	b	15.00		15.00		15.22		0.58	3.81
5	29	5.1	31	14.50	b	15.30		15.90	b	15.30		0.70	4.58
6	7	6	57	15.87		15.68		15.77		15.77		0.10	0.63
7	6	5.6	31	16.65		16.58		16.60		16.61		0.04	0.24
8	38	5.1	32	17.00		16.60		16.40		16.67		0.31	1.86
9	50	4.1	31	17.45		15.23	b	17.00		17.00		1.17	6.88
10	42	4.1	31	18.12	b	12.12	b	17.11		17.11		3.21	18.76
11	21	5.4	31	17.02		17.22		17.36		17.20		0.17	0.99
12	37	6.1	32	17.34		16.98		17.55		17.29		0.29	1.68
13	28	6	58	17.70		16.06	b	17.45		17.35		0.88	5.07
14	36	6.1	58	18.00		16.93	b	19.04	b	18.00		1.06	5.89
15	23a	6.1	31	18.31		18.07		17.94		18.11		0.19	1.05
16	23	3.3	31	21.71	b	15.65	b	18.22		18.22		3.04	16.68
17	43	4.1	31	19.00		19.00		19.00		19.00		0.00	0.00
18	25	5.1	31	19.10		19.32		18.74		19.05		0.29	1.52
19	18	6.5	31	20.07	b	19.29		18.99		19.36		0.56	2.89
20	26	3.2	31	19.51		18.42	b	19.73		19.40		0.70	3.61
21	2	5.2	31	21.41	a	21.73	a	21.43	a	21.52	*	0.18	0.84
22	24	6.5	57	22.53	ab	25.16	a	26.66	ab	25.16	*	2.09	8.31
23	10	6.1	50	25.77	a	28.33	ab	24.97	ab	25.77	*	1.76	6.83

Mean	Interlab.std. deviation	
	abs.	rel.%
17.52	0.80	4.38

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 20 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 23
Percentage of non-tolerable lab means: 17.4


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
>100%
Element:
Cd
% dev. from MEAN
100
80
60
40
20
0
-20
-40
-60
-80
-100
1
2
3
3a
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Evaluation acc. lab. code

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cd
Dimension: ng/g
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes pretreatm.	Method codes determ.	Replications						Lab.mean	Lab.standard deviation abs.	Lab.standard deviation rel.%
1	26	3.2	31	20.00		20.00		20.00		20.00 *	0.00	0.00
2	37	6.1	32	20.00		20.00		20.00		20.00 *	0.00	0.00
3	44	4.1	31	0.00		0.00		20.00		20.00 *		0.00
4	38	5.1	32	21.00	b	22.00		22.00		22.00 *	0.58	2.64
5	13	3.3	21	27.00	b	25.00	b	26.00		26.00	1.00	3.85
6	40	5.5	21	22.00	b	28.60	b	26.40		26.40	3.36	12.73
7	43	4.1	21	30.00		40.00	b	30.00		30.00	5.77	19.23
8	39	5.4	21	38.00	b	37.00		37.00		37.00	0.58	1.57
9	14	4.1	21	36.00	b	39.00		44.00	b	39.00	4.04	10.36
10	25	5.1	21	59.00		59.00		52.00	b	59.00 *	4.04	6.85
11	24	6.2	20	79.00	ab	84.00	a	87.90	ab	84.00 *	4.46	5.31
12	9	5.1	31	451.00	ab	552.00	a	602.00	ab	552.00 *	76.92	13.93
13	36	3.3	20	560.00	a	450.00	ab	630.00	ab	560.00 *	90.74	16.20

Mean	Interlab.std. deviation abs.	Interlab.std. deviation rel.%
36.60	15.96	7.13

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:
Data sets >0 or >detection limit: 13
Percentage of non-tolerable lab means: 61.5

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cd
Dimension: ng/g
Sample: 2 PINE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	26	3.2	31	90.00		80.00	b	90.00		90.00 *	5.77	6.41
2	38	5.1	32	96.00	b	98.00		99.00	b	98.00	1.53	1.56
3	4	2	40	100.00		0.00		0.00		100.00		0.00
4	37	6.1	32	100.00		100.00		100.00		100.00	0.00	0.00
5	47	4.1	31	110.00	b	100.00		100.00		100.00	5.77	5.77
6	14	4.1	21	107.00		102.00	b	120.00	b	107.00	9.29	8.68
7	41	4.1	21	110.00		110.00		110.00		110.00	0.00	0.00
8	39	5.4	21	118.00		120.00	b	117.00	b	118.00	1.53	1.30
9	40	5.5	21	128.80	b	99.10	b	118.80		118.80	15.11	12.72
10	17	5.4	31	137.00		159.00	b	116.00	b	137.00	21.50	15.69
11	13	3.3	21	144.00	b	147.00	b	145.00		145.00	1.53	1.06
12	43	4.1	21	120.00	b	170.00	b	150.00		150.00	25.17	16.78
13	24	6.2	20	158.00		168.00	b	158.00		158.00	5.77	3.65
14	44	4.1	31	350.00	b	160.00		80.00	b	160.00	138.68	86.68
15	36	3.3	20	160.00	b	170.00		170.00		170.00 *	5.77	3.39
16	25	5.1	21	186.00	a	166.00	ab	193.00	ab	186.00 *	14.01	7.53
17	9	5.1	31	354.00	ab	374.00	a	426.00	ab	374.00 *	37.17	9.94

Mean	Interlab.std. deviation	
	abs.	rel.%
130.30	18.04	10.66

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)

Annotation:		
	Data sets >0 or >detection limit:	17
	Percentage of non-tolerable lab means:	23.5

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cd
Dimension: ng/g
Sample: 3 **SPRUCE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	24	6.2	20	288.00	a	320.00	ab	267.00	ab	288.00 *	26.69	9.27
2	4	2	40	300.00	a	400.00	ab	300.00	a	302.22 *	57.74	19.11
3	14	4.1	21	370.00		390.00	b	349.00	b	370.00	20.50	5.54
4	44	4.1	31	530.00	b	320.00	b	400.00		400.00	105.99	26.50
5	38	5.1	32	399.00		402.00		402.00		401.00	1.73	0.43
6	47	4.1	31	400.00		410.00		410.00		407.78	5.77	1.41
7	37	6.1	32	410.00		420.00		420.00		417.78	5.77	1.38
8	26	3.2	31	400.00	b	490.00	b	420.00		420.00	47.26	11.25
9	41	4.1	21	430.00		430.00		430.00		430.00	0.00	0.00
10	39	5.4	21	433.00		434.00		436.00		434.33	1.53	0.35
11	17	5.4	31	431.00	b	453.00		459.00		453.00	14.74	3.25
12	25	5.1	21	478.00		468.00		413.00	b	468.00	35.00	7.48
13	9	5.1	31	458.00		491.00	b	469.00		469.00	16.80	3.58
14	40	5.5	21	510.80	b	392.90	b	471.50		471.50	60.03	12.73
15	43	4.1	21	580.00	b	530.00		490.00	b	530.00	45.09	8.51
16	36	3.3	20	590.00	ab	540.00	ab	570.00	a	570.00 *	25.17	4.42
17	13	3.3	21	563.00	a	581.00	a	582.00	a	579.28 *	10.69	1.85

Mean	Interlab.std. deviation	
	abs.	rel.%
435.60	**28.26**	**6.89**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **23.5**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cd
Dimension: ng/g
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**40**	5.5	21	8.70	b	6.70	b	7.40		**7.40** *	1.01	13.65
2	**26**	3.2	31	10.00		10.00		10.00		**10.00** *	0.00	0.00
3	**37**	6.1	32	10.00		10.00		10.00		**10.00** *	0.00	0.00
4	**38**	5.1	32	14.00		14.00		13.00	b	**14.00** *	0.58	4.14
5	**13**	3.3	21	14.00	b	15.00		17.00	b	**15.00** *	1.53	10.20
6	**43**	4.1	21	10.00	b	20.00		20.00		**20.00** *	5.77	28.85
7	**14**	4.1	21	22.00		19.00	b	26.00	b	**22.00**	3.51	15.95
8	**39**	5.4	21	27.00	b	25.00	b	26.00		**26.00**	1.00	3.85
9	**44**	4.1	31	40.00		0.00		0.00		**40.00** *		0.00
10	**25**	5.1	21	61.00	b	53.00		52.00	b	**53.00** *	4.93	9.30
11	**36**	3.3	20	80.00	ab	100.00	ab	90.00	a	**90.00** *	10.00	11.11
12	**24**	6.2	20	211.00	a	237.00	ab	210.00	ab	**211.00** *	15.31	7.26
13	**9**	5.1	31	354.00	ab	436.00	a	459.00	ab	**436.00** *	55.19	12.66

Mean	Interlab.std. deviation	
	abs.	rel.%
29.75	**8.24**	**9.00**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:		
	Data sets >0 or >detection limit:	**13**
	Percentage of non-tolerable lab means:	**84.6**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**21.00**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: Cd
Dimension: ng/g
Sample: 5 BEECH LEAVES (Slovenia)

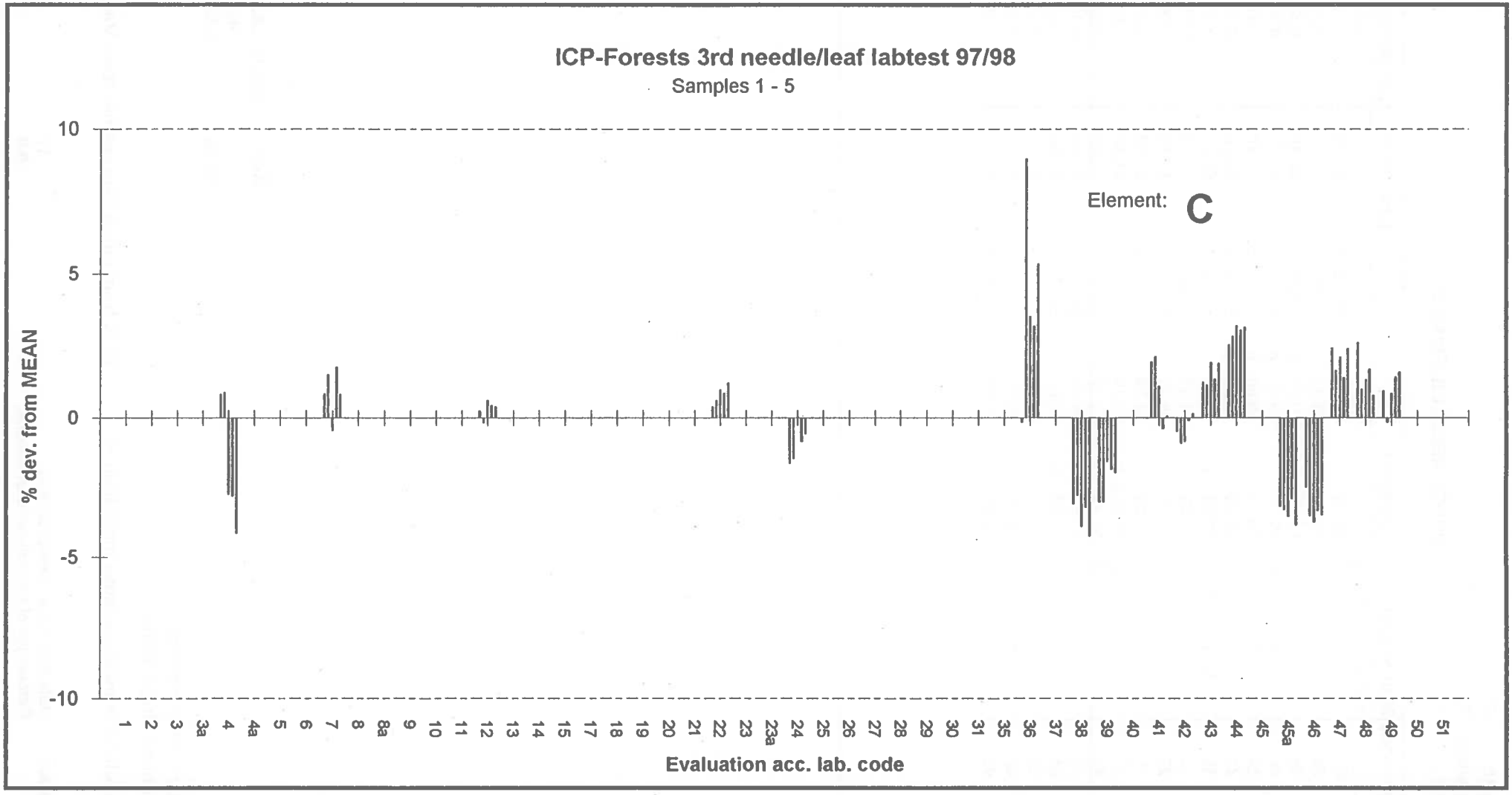
No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**44**	4.1	31	150.00		100.00	b	190.00	b	**150.00**		45.09	30.06
2	**41**	4.1	21	150.00		160.00		160.00		**157.22**		5.77	3.67
3	**37**	6.1	32	170.00		160.00		170.00		**167.22**		5.77	3.45
4	**38**	5.1	32	166.00		170.00		168.00		**168.00**		2.00	1.19
5	**14**	4.1	21	169.00		142.00	b	204.00	b	**169.00**		31.09	18.40
6	**26**	3.2	31	150.00	b	170.00		180.00		**170.00**		15.28	8.99
7	**47**	4.1	31	180.00		170.00		180.00		**177.22**		5.77	3.26
8	**39**	5.4	21	189.00		186.00		185.00		**186.67**		2.08	1.11
9	**40**	5.5	21	207.70		159.80	b	197.60		**197.60**		25.25	12.78
10	**4**	2	40	200.00		200.00		0.00		**200.00**		0.00	0.00
11	**17**	5.4	31	206.00		194.00		268.00	b	**206.00**		39.72	19.28
12	**13**	3.3	21	227.00		218.00		211.00		**218.00**		8.02	3.68
13	**24**	6.2	20	219.00		214.00		225.00		**219.28**		5.51	2.51
14	**36**	3.3	20	250.00	b	230.00		230.00		**232.78**		11.55	4.96
15	**43**	4.1	21	270.00	a	260.00	a	310.00	ab	**270.00**	*	26.46	9.80
16	**25**	5.1	21	317.00	ab	289.00	a	266.00	ab	**289.00**	*	25.54	8.84
17	**9**	5.1	31	445.00	ab	465.00	a	531.00	ab	**465.00**	*	45.00	9.68

Mean	Interlab.std. deviation	
	abs.	rel.%
200.70	**17.64**	**8.33**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **17.6**


ICP-Forests 3rd needle/leaf labtest 97/98
Samples 1 - 5
Element: C
10
5
0
-5
-10
% dev. from MEAN
1 2 3 3a 4 4a 5 6 7 8 8a 9 10 11 12 13 14 15 17 18 19 20 21 22 23 23a 24 25 26 27 28 29 30 31 35 36 37 38 39 40 41 42 43 44 45 45a 46 47 48 49 50 51
Evaluation acc. lab. code

Element: C
Dimension: %
Sample: 1 SPRUCE NEEDLES (Finland)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**45a**	1	13	49.32		49.44		49.13	b	**49.32**	0.16	0.32
2	**38**	1	15.1	49.30		49.40		49.40		**49.37**	0.06	0.12
3	**39**	7.3	13	49.40		50.00	b	49.30		**49.40**	0.38	0.77
4	**46**	1	13	49.77		49.16	b	49.67		**49.67**	0.33	0.66
5	**24**	1	12	50.10		50.80	b	49.40	b	**50.10**	0.70	1.40
6	**42**	1	13	50.70		50.20	b	50.90	b	**50.70**	0.36	0.71
7	**36**	3.81	75	52.93	b	50.83		50.83		**50.87**	1.21	2.38
8	**12**	1	10	51.01		51.19		51.08		**51.09**	0.09	0.18
9	**22**	0	0	51.20		51.20		51.10		**51.17**	0.06	0.12
10	**4**	1	10.1	51.59	b	51.39		51.18	b	**51.39**	0.21	0.41
11	**7**	1	13	49.70	b	51.70	b	51.40		**51.40**	1.08	2.10
12	**49**	1	10	51.45		51.49		51.41		**51.45**	0.04	0.08
13	**43**	1	10	51.60		51.50		51.70		**51.60**	0.10	0.19
14	**41**	1	15.1	51.00	b	52.00		52.00		**51.96**	0.58	1.12
15	**47**	1	15	52.29		52.16		52.17		**52.21**	0.07	0.13
16	**44**	1	13	52.23		52.30		52.27		**52.27**	0.04	0.08
17	**48**	1	13	52.30		51.46	b	52.49	b	**52.30**	0.55	1.05

Mean	Interlab.std. deviation	
	abs.	rel.%
50.96	**0.35**	**0.70**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Vienna 1997)**

Annotation:
Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **0.0**

Element: C
Dimension: %
Sample: 2 **PINE NEEDLES (Finland)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	46	1	13	51.79	b	49.53	b	50.04		**50.04**	1.19	2.38
2	45a	1	13	50.29		50.11		50.16		**50.16**	0.09	0.18
3	39	7.3	13	50.30		50.90	b	49.40	b	**50.30**	0.75	1.49
4	38	1	15.1	50.60	b	50.40		50.40		**50.42**	0.12	0.24
5	24	1	12	51.40	b	51.10		50.80	b	**51.10**	0.30	0.59
6	42	1	13	51.50		51.30		51.40		**51.40**	0.10	0.19
7	12	1	10	51.65		51.82		51.80		**51.79**	0.09	0.17
8	49	1	10	51.79		51.84		51.77		**51.80**	0.04	0.08
9	22	0	0	52.20		52.20		52.40	b	**52.22**	0.12	0.23
10	4	1	10.1	52.36		52.26		52.75	b	**52.36**	0.26	0.50
11	48	1	13	52.39		52.49		52.40		**52.42**	0.06	0.11
12	43	1	10	52.70	b	52.50		52.30	b	**52.50**	0.20	0.38
13	7	1	13	52.20	b	52.70		52.70		**52.68**	0.29	0.55
14	47	1	15	52.78		52.77		52.74		**52.76**	0.02	0.04
15	41	1	15.1	53.00		53.00		53.00		**53.00**	0.00	0.00
16	44	1	13	53.37		53.73	b	53.25		**53.37**	0.25	0.47
17	36	3.81	75	57.02	ab	56.53	a	56.53	a	**56.55**	0.28	0.50

Mean	Interlab.std. deviation	
	abs.	rel.%
51.89	**0.24**	**0.48**

a = lab.mean is trimmed
b = trimmed single value

* =not tolerable mean because more than +/- 10 % from mean (Agreement from Vienna 1997)

Annotation: Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **0.0**

Element: C
Dimension: %
Sample: 3 SPRUCE NEEDLES (Germany)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**38**	1	15.1	47.40	a	47.50	a	47.60	a	**47.50**	0.10	0.21
2	**46**	1	13	49.54	b	47.16	b	47.57		**47.57**	1.27	2.67
3	**45a**	1	13	47.67		47.58		47.76		**47.67**	0.09	0.19
4	**4**	1	10.1	48.03		48.14		48.00		**48.06**	0.07	0.15
5	**39**	7.3	13	48.70		48.60		48.60		**48.63**	0.06	0.12
6	**42**	1	13	49.00		48.40	b	49.30	b	**49.00**	0.46	0.94
7	**7**	1	13	48.90	b	49.80	b	49.20		**49.20**	0.46	0.93
8	**24**	1	12	48.10	b	49.50		49.50		**49.46**	0.81	1.64
9	**12**	1	10	49.73		49.86		49.71		**49.76**	0.08	0.16
10	**49**	1	10	49.84		49.88		49.90		**49.87**	0.03	0.06
11	**22**	0	0	49.90		50.20	b	49.90		**49.94**	0.17	0.34
12	**41**	1	15.1	50.00		50.00		50.00		**50.00**	0.00	0.00
13	**48**	1	13	49.75	b	50.11		50.55	b	**50.11**	0.40	0.80
14	**43**	1	10	50.30		50.40		50.50		**50.40**	0.10	0.20
15	**47**	1	15	50.49		50.65		50.34		**50.49**	0.16	0.32
16	**44**	1	13	51.27	b	50.84	b	51.03		**51.03**	0.22	0.43
17	**36**	3.81	75	51.46	b	51.17		51.13		**51.19**	0.18	0.35

Mean	Interlab.std. deviation	
	abs.	rel.%
49.44	**0.27**	**0.56**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **0.0**

ICP-Forests 3rd needle/leaf labtest 97/98

Element: C
Dimension: %
Sample: 4 OAK LEAVES (Spain)

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	46	1	13	47.57		46.74	b	47.78	b	**47.57**	0.55	1.16
2	38	1	15.1	47.60		47.60		47.70		**47.63**	0.06	0.13
3	45a	1	13	47.78		47.61	b	47.84		**47.78**	0.12	0.25
4	4	1	10.1	47.81		47.97	b	47.79		**47.83**	0.10	0.21
5	39	7.3	13	48.80	b	48.30		47.90	b	**48.30**	0.45	0.93
6	24	1	12	50.20	b	48.70		48.80		**48.80**	0.84	1.72
7	41	1	15.1	49.00		49.00		50.00	b	**49.03**	0.58	1.18
8	42	1	13	49.20		48.80	b	49.20		**49.17**	0.23	0.47
9	12	1	10	49.43		49.50		49.41		**49.45**	0.05	0.10
10	22	0	0	49.70		49.70		49.60		**49.67**	0.06	0.12
11	43	1	10	50.00		49.90		49.70	b	**49.90**	0.15	0.30
12	47	1	15	49.96		49.92		49.91		**49.93**	0.03	0.06
13	49	1	10	49.97		49.95		49.90		**49.94**	0.04	0.08
14	48	1	13	50.11		50.07		50.04		**50.07**	0.04	0.08
15	7	1	13	50.10		50.20		49.70	b	**50.10**	0.26	0.52
16	44	1	13	50.65		50.79		50.76		**50.74**	0.07	0.14
17	36	3.81	75	51.07	b	50.74		50.79		**50.80**	0.18	0.35

Mean	Interlab.std. deviation	
	abs.	rel.%
49.23	**0.22**	**0.46**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Vienna 1997)**

Annotation:	Data sets >0 or >detection limit:	**17**
	Percentage of non-tolerable lab means:	**0.0**
	Mean of 2nd Needle/Leaf Test 95/96 sample 3:	**48.87**

Element: C
Dimension: %
Sample: 5 **BEECH LEAVES (Slovenia)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**38**	1	15.1	46.70	b	46.90		47.10	b	**46.90**	0.20	0.43
2	**4**	1	10.1	46.92		46.92		47.12		**46.95**	0.12	0.26
3	**45a**	1	13	47.09		47.13		47.06		**47.09**	0.04	0.08
4	**46**	1	13	50.18	b	46.63	b	47.26		**47.26**	1.89	4.00
5	**39**	7.3	13	48.70	b	48.00		47.20	b	**48.00**	0.75	1.56
6	**24**	1	12	48.70		48.30	b	49.30	b	**48.70**	0.50	1.03
7	**41**	1	15.1	49.00		49.00		50.00	b	**49.03**	0.58	1.18
8	**42**	1	13	49.10		48.90		49.10		**49.07**	0.12	0.24
9	**12**	1	10	49.16		49.25		49.17		**49.19**	0.05	0.10
10	**48**	1	13	49.15	b	49.39		49.52		**49.39**	0.19	0.38
11	**7**	1	13	49.40		48.50	b	49.50		**49.40**	0.55	1.11
12	**22**	0	0	49.80	b	49.60		49.50		**49.60**	0.15	0.30
13	**49**	1	10	49.80		49.75		49.79		**49.78**	0.03	0.06
14	**43**	1	10	50.30	b	49.90		49.90		**49.93**	0.23	0.46
15	**47**	1	15	50.17		50.17		50.19		**50.18**	0.01	0.02
16	**44**	1	13	50.54		50.41		50.75	b	**50.54**	0.17	0.34
17	**36**	3.81	75	51.73	a	51.52	a	51.62	a	**51.62**	0.11	0.21

Mean	Interlab.std. deviation	
	abs.	rel.%
48.99	**0.33**	**0.69**

a = lab.mean is trimmed
b = trimmed single value

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Vienna 1997)**

Annotation: Data sets >0 or >detection limit: **17**
Percentage of non-tolerable lab means: **0.0**

ICP-Forests 3rd needle/leaf interlaboratory test 1997/1998

Additional parameters (mean from 3 values)

Element	Lab	Methods		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Cr (µg/g)	4	2	40	4.53	4.23	< 1	3.37	< 1
	12	5,1	31	4.94	6.47	1.34	5.27	3.09
	18	6,5	31	3.85	7.09	0.59	4.24	0.52
	26	3,2	26	2.27	3.61	0.98	4.27	6.55
	44	4,1	31	4.85	7.01	0.95	4.39	0.53
	45	3,1	31	3.77	5.50	1.57	4.07	1.33
	47	4,1	31	4.07	5.79	0.97	3.90	0.52
	50	4,1	31	3.74	6.10	0.95	4.70	0.63
Ni (µg/g)	4	2	40	2.73	3.23	1.97	1.63	< 0.7
	12	5,1	31	4.34	4.19	2.93	2.29	n.d.
	18	6,5	31	4.28	5.85	2.35	3.15	2.08
	26	3,2	31	4.24	6.52	8.16	7.07	6.90
	44	4,1	31	3.94	4.62	2.36	1.87	0.46
	45	3,1	31	4.27	4.80	3.27	2.27	1.50
	47	4,1	31	3.84	4.56	2.36	2.02	n.d.
	50	4,1	31	3.23	3.93	1.90	1.53	< .25
Co (µg/g)	44	4,1	31	0.10	0.13	0.57	0.14	0.02
	45	3,1	31	0.70	0.57	1.10	<0.5	0.57
	50	4,1	31	0.15	0.15	0.55	0.18	< 0.05
Si (µg/g)	4	2	40	1650.00	530.00	9180.00	1520.00	6810.00
	4a	2	41	1490.00	410.00	9820.00	1550.00	7490.00
	44	4,1	85	2880.00	1073.00	11350.00	3160.00	7160.00

Element	Lab	Methods		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Ba (µgg)	4	2	40	11.30	3.60	6.30	5.20	27.00
	6	0	0	14.00	3.70	6.50	4.60	32.20
	26	3,2	31	16.10	5.70	9.10	4.90	40.20
	45	3,1	31	15.00	3.00	6.00	3.00	34.00
	50	4,1	31	12.60	2.80	5.40	2.80	29.00
Sr (µg/g)	4	2	40	11.70	5.00	7.20	7,8	31.00
	26	3,2	31	13.60	5.70	8.30	8.40	37.00
	45	3,1	31	12.40	5.00	7.60	7.40	33.00
Cl (µg/g)	3	9	70	380.00	290.00	700.00	150.00	207.00
	4	2	40	386.00	316.00	714.00	168.00	141.00
	4a	2	41	390.00	307.00	823.00	157.00	130.00
	42	7,2	60	379.00	300.00	735.00	170.00	128.00
F (µg/g)	3	7,1	80	3.50	3.00	10.60	7.50	5.40
	4	6	80	2.00	1.90	11.00	7.30	5.30
As (µg/g)	4	2	40	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Se (µg/g)	4	2	40	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Br (µg/g)	4	2	40	0.10	0.60	1.10	1.80	0.50
Rb (µg/g)	4	2	40	32.60	34.20	15.60	2.00	18.00
Y (µg/g)	4	2	40	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Zr (µg/g)	4	2	40	< 0.5	0.50	< 0.5	1.30	< 0.7
Mo (µg/g)	4	2	40	< 0.7	< 0.7	0.90	< 0.7	< 0.7
Sn (µg/g)	4	2	40	< 0.6	< 0.6	0.70	< 0.6	< 0.6
Cs (µg/g)	4	2	40	<2	< 2	< 2	< 2	1.70
La (µg/g)	4	2	40	< 4	< 4	< 4	< 4	< 4

Moisture % 105 *C	8b	85	2.17	1.69	2.33	1.67	2.24
105 *C	39	85	4.00	3.70	4.00	3.20	4.50
105 *C	43	85	4.54	4.62	7.17	5.61	7.23
W_{80}-W_{105} / W_{105}	5	85	0.68	0.45	0.27	0.16	0.06