ICP-Forests 5th Needle/Leaf Interlaboratory Test 2001/2002

Results

(August, 2002)

by

Dr. Ulrich Bartels

North Rhine-Westfalia State Environment Agency (LUA)
Wallneyer Str. 6 * D-45133 Essen
Telephone: +49-201/7995-2807 Fax: +49-201/7995-2828
e-mail: ulrich.bartels@lua.nrw.de

1. Summary

The results of the 5th ringtest of ICP Forests show in general a good analytical quality in foliar analysis. Compared with the 4th ringtest the results of some elements improved (K, Zn, Mn, Cu, Pb, B, Na), but the analysis of Nitrogen, Sulphur and very astonishingly of Carbon got worse. The reason may be that according to the suggestions of ICP-Forests some laboratories changed from classical methods to CNS-elemental analysers or analysed this element for the first time. In some cases there is too little experience with these new apparatus and their calibrations. This shows, that a high standard is to be elaborated by a daily praxis of good quality control. Quality control must become a tradition for each laboratory and for each new member of the staff too.

The results of the 5th ringtest confirm the conclusions of the last one: It is reasonable to restrict the allowed methods to a minimum:

1. Elemental analysers (for C, N and S)
2. HNO_3-digestions in closed systems (pressure bomb or microwave) in combination with ICP-OES or ICP-MS (for S, P, Ca, etc.) or Flameless-AAS (for Cu, Pb, Cd)
3. X-ray fluorescence analysis for S, P, Ca, Mg, K, Zn, Mn, and Cu, Pb, Cd, if the contents are not too low.

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 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 panels in Vienna 1997 (BARTELS 1996, STEFAN et al. 1997). The expert panel in Vienna therefore decided on a complete repetition and authorised the Landesumweltamt North-Rhine-Westfalia (LUA) to organise another interlaboratory test on foliage every two years. The 3rd interlaboratory study with 5 unknown samples (spruce, pine, oak, beech) and its consequences for the analytical quality management (BARTELS 1998) were intensively discussed in Bonn 1999 and ended with a revision of Part IV “Sampling and analysis of needles and leaves” of the above mentioned manual.

These results of the 4th test (Bartels 2000) were discussed by the expert-panel in Tampere (Finland) in Sept. 2001. The minutes of this meeting state:

- “considerable improvements for the mandatory elements compared to the 3rd ringtest. However further improvements are needed. Taking into account difficulties with analysing Na and Al the group agreed to delete those elements from the optional parameter list of the submanual” (Point 4 of Draft minutes of the 7th Foliar Expert panel meeting from 10 to 11 September 2001 in Tampere/Finland).

- “After in depth discussion it was decided that it is strongly recommended to use in future the element analyses for C, N and S and HNO3 digestions in closed systems in combination with ICP methods for the remaining elements. Reference is made to the report with detailed results from the 4th ring-test (Bartels 2000). Countries not able to follow this recommendation are allowed to use other methods as described in the ICP Forest Manual (for details see www.icp-forest.org) on the understanding that sufficient accuracy is reached.” (Point 5)

- “The Expert Panel recommend to decode the number used for the national laboratories in the ring-test for internal use in the Expert Panel. Reservations against this recommendation are welcomed before the end of October 2001.” (Point 6)

- The Expert Panel agreed to open the ring-test to laboratories outside of the programme on the understanding that also in future separate evaluations should made for those labs involved in the ICP Forests work at level I or Level II.” (Point 8)

1.2 Material

In July 2001 the LUA sent dried plant powder of the following five samples to about 50 European laboratories:

1. Spruce needles (Slovakia)
2. Spruce needles (Norway)•
3. Spruce needles (Germany)
4. Pine needles (Germany)

All materials were foremost ground with a Retsch-centrifugal-mill (sieve 0.25 mm, Cr-Ni steel) and homogenised by the LUA-laboratory by shaking over head for 24 hours before dispatch.

I have to thank **Branka Mankowska** (Zvolen) **Hannu Raitio** (Parkano), **Lutz Genßler** (Recklinghausen, D) and their co-workers for sampling and my co-workers **Hans-Joachim Fermer** for preparing the samples and **Ursula Busch** for various help in preparing the data processing and text translation.

1.3 Participant countries

53 laboratories from 29 countries joined in this test (1st test: 24/21; 2nd test: 39/25; 3rd test 51/29, 4th test 52/29).
Figure 1 gives an overview of the participant countries. Because of diverse problems we got no results from Belarus. From Sweden we got not any response.

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. An 'a' after the number means the x-ray- laboratory of the same institute. Five laboratories (4a, 37a, 38a, 51, 55a) used x-ray-spectroscopy.

- **Sample 2 was – unknown to the participants – identical with sample 2 ('spruce needles Finland') of the 3rd interlaboratory test.**

Figure 1: Europe map of participant countries

1.4 Task

The laboratories were asked to analyse the following elements with three replicates before November, 30th 2001 :

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

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.

2. Data 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 and all optional elements
The evaluation is presented in the same way as in the past 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 outliers and its complete 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. For 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).

[*] **Sodium and aluminium were deleted from the list of optional elements by ICP Forests expert panel (September 2002)**
[*]

Table 1.: Participant laboratories and elements they analysed

Nr.	N	S	P	Ca	Mg	K	Zn	Mn	Fe	Cu	Pb	Cd	B	C	Na	Al
1	X	X	X	X	X	X	X									
2	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
3	X	X	X	X	X	X	X	X	X							
4	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
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		
8	X	X	X	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	X
10	X	X	X	X	X	X	X	X	X	X						
11	X	X	X	X	X	X	X	X	X	X	X			X		X
12	X	X	X	X	X	X	X	X	X	X				X	X	X
13	X	X	X	X	X	X	X	X		X				X		
14	X	X	X	X	X	X	X	X	X	X			X			
15	X	X												X		
16	X	X	X	X	X	X	X	X	X	X			X		X	X
17	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								X		
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21																
22																
23	X	X	X	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		
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
27	X			X	X	X	X	X	X	X	X				X	
28	X	X	X	X	X	X	X	X	X	X			X			
29	X	X	X	X	X	X	X	X	X	X			X			
30	X	X	X	X	X	X									X	
32																
33				X	X	X	X	X	X	X	X	X			X	
34																
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	X
37a		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
38a		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	X

40	X	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	
44	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	X	X	X
46	X	X	X	X	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
48	X	X	X	X	X	X	X	X	X	X				X		X
49		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	
51	X	X	X	X	X	X		X	X							
52	X		X	X	X	X	X	X	X	X	X			X	X	X
53																
54	X	X	X	X	X	X	X	X	X	X	X	X			X	X
55	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
55a		X	X	X	X	X	X	X	X	X	X				X	X

The complete data are presented on **pages 2-1** and following. 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 of the 5th interlaboratory test 1999/2000 to former ring tests

As mentioned before, sample 5 (beech, Slovenia) of the 3rd test and sample 4 (“beech Slovakia”) have been identical. The following **Table 2** gives a comparison between these two samples.
For almost all elements the means harmonize very well. It proves a very good comparability between the 5th and former ringtests.

Table 2: Mean comparison of sample 2 (3rd ring test) and sample 2 (5th ring test) (*n* = number of data sets)

	3rd test 97/98 sample 2		**5th test 01/02 sample 2**	
Element	**Robust Stat.**	***N***	**Robust Stat.**	***N***
Nitrogen (mg/g)	**11.77**	*45*	**11.73**	*47*
Sulphur (mg/g)	**0.86**	*46*	**0.84**	*49*
Phosphorus (mg/g)	**1.39**	*50*	**1.39**	*49*
Calcium (mg/g)	**2.46**	*49*	**2.38**	*49*
Magnesium (mg/g)	**1.04**	*49*	**1.03**	*49*
Potassium (mg/g)	**5.12**	*50*	**5.17**	*49*
Zinc (µg/g)	**42.12**	*45*	**41.79**	*48*
Manganese (µg/g)	**323.40**	*46*	**318.3**	*49*
Iron (µg/g)	**69.38**	*45*	**68.93**	*47*
Copper (µg/g)	**3.52**	*38*	**3.41**	*43*
Lead (µg/g)	**0.61**	*19*	**0.55**	*24*
Cadmium (ng/g)	**130.30**	*17*	**104.4**	*22*
Boron (µg/g)	**11.82**	*23*	**11.60**	*26*
Carbon (%)	**51.89**	*17*	**52.33**	*28*
Sodium (µg/g)	**34.27**	*37*	**35.02**	*28*
Aluminium (µg/g)	**293.20**	*33*	**283.20**	*27*

2.3 Data Evaluation

The agreements of As (1994) and Vienna (1997) say that the ring tests should be evaluated on the basis of fixed limits. **Table 3** presents an overview of the percentage of non-tolerable values, based on the original data given on pp 2-1.

Table 3: Percentage of non tolerable values; comparison of 2nd, 3rd ,4th and 5th ring test

		2nd Labtest 1995/96		**3rd Labtest 1997/98**		**4th Labtest 1999/00**		**5th Labtest 2001/02**	
Element	**Tolerable deviation from mean (±%)**	**Non tolerable (%)**	***n***	**Non tolerable (%)**	***n***	**Non tolerable (%)**	***n***	**Non tolerable (%)**	***n***
N	15* / 10**	**2.7**	*148*	**4.4**	*225*	**6.6**	*196*	**10.1**	*188*
S	20	**25.8**	*132*	**14.3**	*230*	**9.8**	*184*	**14.2**	*196*
P	15	**6.8**	*148*	**19.6**	*250*	**7.1**	*196*	**8.2**	*196*
Ca	15	**9.6**	*156*	**16.3**	*245*	**6.6**	*196*	**8.2**	*196*
Mg	15	**12.2**	*156*	**16.7**	*245*	**5.1**	*196*	**6.1**	*196*
K	15	**7.7**	*156*	**20.4**	*250*	**6.6**	*196*	**4.1**	*196*
Zn	20	**18.9**	*132*	**16.9**	*225*	**12.0**	*183*	**8.3**	*192*
Mn	20	**3.6**	*139*	**10.9**	*229*	**4.2**	*192*	**1.0**	*196*
Fe	20	**20.6**	*136*	**23.7**	*224*	**17.9**	*196*	**19.1**	*188*
Cu	30	**20.7**	*116*	**16.2**	*191*	**20**	*165*	**9.8**	*174*
Pb	30	**53.0**	*66*	**42.4**	*99*	**32.1**	*78*	**23.9**	*109*
B	20	**33.9**	*56*	**18.2**	*115*	**18.4**	*103*	**12.5**	*104*
Cd	30	**48**	*25*	**39.0**	*77*	**16.9**	*65*	**21.6**	*88*
C	10* / 5**	**0**	*24*	**0**	*85*	**3.3**	*60*	**20.5**	*112*
Na	30	**61.0**	*84*	**46.6**	*178*	**43.4**	*136*	**25.0**	*120*
Al	20	**32.3**	*99*	**31.1**	*164*	**16.1**	*124*	**13.1**	*107*

*** 2nd and 3rd Labtest, ** 4th and 5th Labtest**

The percentage of results out of the given tolerable limits decreases for many elements (K, Zn, Mn, Cu, Pb, B, Na !) but decreased for Nitrogen, Sulphur and very astonishingly of Carbon. The reason may be that according to the suggestions of ICP-Forests some laboratories changed from classical methods to CNS-elemental analysers or analysed this element for the first time. This is surely the case for Carbon where the number of given data doubled from 60 to 112. In some cases is too little experience with these new apparatus and their calibrations. This shows, that a high standard is to be elaborated by a daily praxis of good quality control. elements, especially for all mandatory elements.

The analysis of Aluminium is a special problem because only three laboratories used HF and fulfilled ICP Forests manual. These data are not correct. Aluminium is no longer on the list of optional elements.

Table 4 gives a short survey about the laboratories with 'values out of tolerance'.

Values out of tolerance < = too low > = = too high

ICP Forests interlaboratory comparision 2001/2002

Lab No	N	S	P	Ca	Mg	K	Zn	Mn	Fe	Cu	Pb	Cd	B	C
1	*	>	*	<<	*	*	*							
2	*	*	>	*	*	*	*	*	*	*	*		*	<<<<
3	*	*	*	*	*	*	*	*	*					
4	*	*	*	*	*	*	*	*	*	*	*	<	*	<<<
4a		*	*	*	*	*	*	*	>>>>	*	*	*		
5	<	<<<	*	<<<	*	*	*	*	>>>>	<				
6	>	*	*	*	*	*	*	*	>	*			*	<<<
7	*	*	*	*	*	*	*	*	<<<	*			*	*
8	*	*	*	*	*	*	*	*	>	*	<	*	<<	>>
9	*	*	*	*	<	*	*	*	*	*	<<	*		<<<<
10	*	<	<	<>>	>>>>	*	*	*	*	>>>>				
11	>	*	*	*	*	*	*	*	*	*	*			*
12	*	*	*	*	*	<<<	*	*	*	>				*
13	*	*	*	<	*	*	<<	*		>>				*
14	<<<<	*	<	*	*	*	*	*	<	<			<	
15	*	>>>>				<								>>>
16	<	*	*	*	*	*	*	>>	<<<	*			*	
17	*	*	*	*	*	*	*	*	*	*	*	*	*	
18	<<<<	*	<<<	*	*	*	*	*	>	*	>>	*	*	
19	*	>>>	*	>>>	*	*								*
20	>	*	*	*	*	*	>	*	*	*	<	<	<>	*
21														
22														
23	*	>>	*	*	*	*	*	*	>>>	>>		*	*	
24	*	*	*	*	*	*	*	*	>	*	*	>>>>	>	*
25	*	*	*	*	>>>	*	*	*	*	*	>>	>	*	
26	>	*	<<<<	*	*	<<<<	*	*	*	*	*	>	*	
27	*			<<<	<<<	>>>>	*	*	*	*	>			
28	*	*	*	*	*	*	*	*	<	*			*	
29	*	*	>>>	*	*	*	*	*	*	*			*	
30	*	<<<	*	>>>	<<	*								
32														
33				*	*	*	*	*	*	*	>>	*		
34														

35	**>**		**>**		**<<<**	*****								
36	*****	**<**	*****	*****	*****	*****	**<<<<**	*****	**<<<<**	**>>>**	**>>>**	**>>>>**	**>>>>**	*****
37	*****	**>>>>**	*****	*****	*****	*****	*****	*****	**<**	*****	*****	*****	*****	*****
37a		**>>**	*****	*****	*****	*****	**>>**	*****	**<**	*****				
38	*****	**>>>>**	*****	*****	*****	*****	*****	*****	*****	*****	**<**	*****	*****	*****
38a		*****	*****	*****	*****	*****	*****	*****	**>**	*****				
39	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	**<**	**<<<<**
40	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	**<**	**>**	*****	*****
41	*****	*****	*****	*****	*****	*****	**>>>>**	*****	*****	*****	*****	**<**		*****
42	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
43	*****	*****	*****	*****	**<**	*****	*****	*****	**<**				**>>**	*****
44	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****		*****
45	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	**<<**	*****	*****
46	**>>>>**	*****	**<<<<**	**<<<<**	*****	*****	*****	*****	**>**	*****	**<**	**>**		*****
47	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	**<**		*****
48	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****				*****
49		*****	*****	*****	*****	*****	*****	*****	**>**	*****				
50	*****	*****	*****	*****	*****	*****	*****	*****	**<<**	*****	**>>**	*****	*****	*****
51	*****	*****	*****	*****	**>>>**	*****		*****	*****					
52	*****		*****	*****	*****	*****	**<<<**	*****	*****	*****	**>>>>**			*****
53														
54	*****	*****	*****	*****	*****	*****	*****	*****	**>**	**<<**	**>**	**<**		
55	*****	*****	*****	*****	*****	*****	*****	*****	*****	**>**	*****	*****	*****	*****
55a		*****	**>>**	*****	*****	*****	*****	*****	**>**	*****	**<<**			

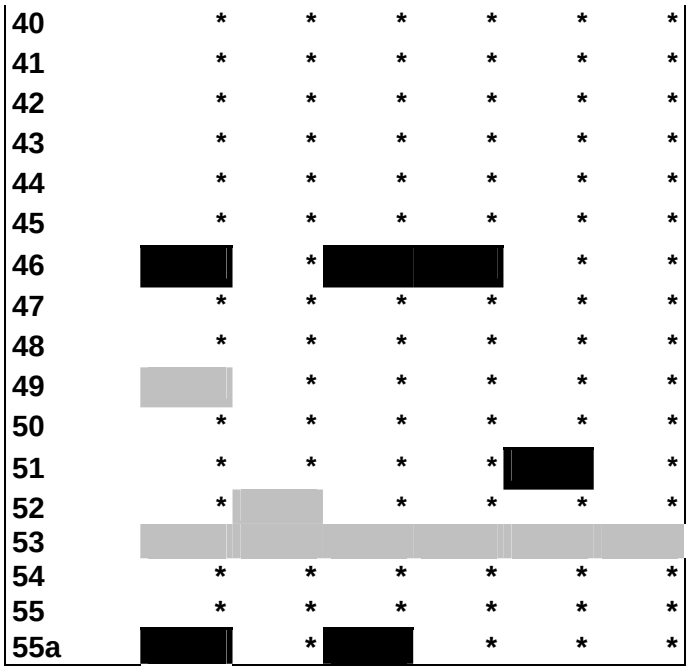
The consequences of these results have not been finally discussed by the foliar experts of ICP Forests. But only national data of proved quality can be taken into surveys of forest condition in Europe. Here are proposed two main criteria to use:

- All national laboratories have mandatory to participate the ICP Interlaboratory study with 4 samples every second year.
- Only the results from those elements with max. 25% of non tolerable values (= max. 1outlier for each element in the case of four samples to be analysed) can be accepted. Otherwise the complete element data are to be revised.

These criteria are demonstrated in **Table 5** for the mandatory elements

- point = all results of the element fulfil the quality criteria
- grey = no results given
- black = more than 25 % of results are non tolerable

Evaluation of laboratories						
ICP Forests interlaboratory comparision 2001/2002						
Lab No	N	S	P	Ca	Mg	K
1	*	*	*		*	*
2	*	*	*	*	*	*
3	*	*	*	*	*	*
4	*	*	*	*	*	*
4a		*	*	*	*	*
5	*		*		*	*
6	*	*	*	*	*	*
7	*	*	*	*	*	*
8	*	*	*	*	*	*
9	*	*	*	*	*	*
10	*	*	*			*
11	*	*	*	*	*	*
12	*	*	*	*	*	
13	*	*	*	*	*	*
14		*	*	*	*	*
15	*					*
16	*	*	*	*	*	*
17	*	*	*	*	*	*
18		*		*	*	*
19	*		*		*	*
20	*	*	*	*	*	*
21						
22						
23	*		*	*	*	*
24	*	*	*	*	*	*
25	*	*	*	*		*
26	*	*		*	*	
27	*					
28	*	*	*	*	*	*
29	*	*		*	*	*
30	*		*			*
32						
33				*	*	*
34						
35	*		*			*
36	*	*	*	*	*	*
37	*		*	*	*	*
37a			*	*	*	*
38	*		*	*	*	*
38a		*	*	*	*	*
39	*	*	*	*	*	*



3. Evaluation by analysis methods

This part will discuss in more details the problems of used pretreatment and measurement methods.

The evaluation by methods is based on the following information for each element:

a) Elementspecific code index according to the used methods on pp 1-19.

b) Original laboratory data with graphic presentation on pp 2-1

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 column represents one of the 4 samples. The broken lines define the tolerable limits (see table 3).

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

c) Presentations of data arranged acc. method codes on pp 3-1

For these graphs the same explanations are valid as for the graphs of the original data pp 2-1.

It will be tried to gain important results from this ringtest for each element by comparing graphs for each digestion and determination method. Methods that lead to the best comparable results and help to further optimise and, if possible, concentrate/condense the manual will be highlighted.

The overview of **Table 6** demonstrates that numerous values out of tolerance depend on low element contents in the foliar samples. In most cases lower element contents cause higher numbers of intolerable values.

ICP Forests interlaboratory comparison 2001/2002

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

Element	Sample:	1 spruce	2 spruce	3 spruce	4 pine-D
N	mg/g	12,53	11,73	13,91	20,04
	%	14,9	10,6	8,5	6,4
S	mg/g	1,29	0,84	1,03	1,34
	%	10,2	18,4	10,2	18,4
P	mg/g	1,28	1,39	1,39	1,62
	%	12,2	8,2	8,2	4,1
Ca	mg/g	11,25	2,38	3,87	2,58
	%	6,1	8,2	6,1	12,2
Mg	mg/g	0,79	1,03	0,59	0,74
	%	10,2	4,1	4,1	6,1
K	mg/g	6,92	5,17	4,20	5,48
	%	6,1	4,1	2,0	4,1
Zn	µg/g	55,58	41,79	22,67	50,13
	%	6,3	8,3	10,4	8,3
Mn	µg/g	304,90	318,30	1271,00	975,80
	%	0	0	2,0	2,0
Fe	µg/g	108,20	68,93	109,60	143,50
	%	29,8	19,1	14,9	12,8
Cu	µg/g	4,41	3,41	3,02	4,28
	%	9,1	11,6	11,6	6,8
Pb	µg/g	2,35	0,55	0,82	1,99
	%	20,0	42,0	30,1	6,9
Cd	ng/g	34,54	104,40	103,30	443,20
	%	52,6	9,1	21,8	8,3
B	µg/g	20,80	11,60	10,48	18,17
	%	7,7	15,4	19,2	7,7
C	%	50,56	52,33	52,34	52,40
	%	21,4	25,0	14,3	21,43
Na	µg/g	46,39	35,02	71,71	220,70
	%	46,4	53,6	19,4	6,1
Al*	µg/g	(78,07)	(283,20)	(138,70)	(220,30)
	%	(42,3)	(0)	(7,4)	(3,7)

3.1 Nitrogen (pp 2-1, 3-1, 3-2)

* For the Al-problem pay attention to chapter 3.18 on page 1-18

In comparison with the 4th ringtest the percentage of outliers increased from 6.6% to 10. 1%. Three laboratories (14, 18, 46) failed with all four samples. Some other laboratories have a single outlier. They used different methods.
Eight laboratories still use the traditional Kjehldal-methods. The trend to Kjehldal-apparatus or to elemental analysers is evident. The use of Kjehldahl-apparatus (D11) show a tendency to lower values and more outliers.
The dominance of elemental analysers (C-N-S) is to be expected in the future.

3.2 Sulphur (pp 2-6, 3-3, 3-4)

In comparison with the 4th ringtest the percentage of outliers increased from 9.,8% to 14.2%. Eight Laboratories failed with two and more samples. The reason is to be found within the laboratories because they used different methods.
28 laboratories used ICP for determination, 8 laboratories used an elemental analyser and 5 of them used X-ray-spectroscopy. The results are mostly good, specially for the combination of closed digestion (P 4.1 / P 5.1) with ICP (D 31).
Dry ashing and classical titration cannot longer been accepted. This method tends to lower values.

3.3 Phosphorus (pp 2-11, 3-5, 3-6)

The results are good. Only a three laboratories (26, 29, 46) have apparently difficulties with the determination of phosphorus. This may be due to internal problems because the participants applied different methods.
Generally all wet digestions using HNO_3 followed by determination by ICP lead to very good results.
Results achieved by X-ray-spectroscopy are acceptable.
Photometric methods tends to lower values.
Best results are gained with digestions in a closed system and determination with ICP-spectroscopy.

3.4. Calcium (pp 2-16, 3-7, 3-8)

The results are not so good as they have been in the 4th ringtest. Six laboratories (5, 10, 19, 27, 30, 46) found extremely deviating results for calcium. They used different methods.
The best results can be obtained from the combination of HNO_3 digestion in a closed system with ICP determination. Dry ashing methods cannot longer been accepted.
Results from X-ray spectroscopy are good.

3.5 Magnesium (pp 2-21, 3-9, 3-10)

The have the same results for magnesium as for Calcium and find more laboratories with problems (10, 25, 27, 30, 36, 51)
The best results are obtained from combined HNO_3 digestion with ICP. This will be the chosen method for magnesium as well.
Results from energy disperse X-ray-spectroscopy are acceptable.

3.6 Potassium (pp 2-26, 3-11, 3-12)

Results for potassium are very well. Only three laboratories (12, 26, 27) have too much outliers.
Pressure digestion in combination with ICP leads to the best results and should be preferred in future. Yet results obtained by flame AAS or classic flame photometry are fairly acceptable.
Results from X-ray spectroscopy are good.

3.7 Zinc (pp 2-31, 3-13, 3-14)

Zinc causes problems for five laboratories (13, 36, 37a, 41, 52). But the number of values below the tolerance limit of ± 20% is with 8,3% even lower than in the 3rd and the 4th ringtest.
Open acidic digestion should be avoided. Digestion with HNO3 in closed pressure or microwave systems is recommended.
ICP-OES and with restriction X-ray fluorescence spectrometry have proved advantageous against flame AAS.

3.8 Manganese (pp 2-36, 3-15, 3-16)

Manganese shows with only 1% the lowest number of values outside the limits. Only one laboratory (16) find too high values in two samples.
All methods (HNO_3-digestion with AAS or ICP, resp. X-ray spectroscopy) are useful.

3.9 Iron (pp 2-41, 3-17, 3-18)

This is the element which become not better within the last 4 ringtests. The number of values beyond the limits of ± 20% is still too high. Similar to sodium the ubiquity of iron in all laboratory equipment plays an important role and it is supposed that the analytical problems will decrease with higher values (> 100µg/kg).
Graphic evaluation according to digestion methods indicates risks with open acid digestion.
Simple pressure digestion with HNO_3 followed by ICP is recommended, microwave digestion would be the second choice.
X-ray fluorescence analysis proved to be not feasible.

3.10 Copper (pp 2-46, 3-19, 3-20)

The results are surprisingly good. In the last 3 ringtests we stated about 20% of outliers, now we find only 10%.
Only 5 laboratories show clearly deviating results (10, 13, 24, 35, 54). A look at the graphic evaluation reveals that 3 of them used open systems, two of them microwave digestion.
Nevertheless, pressure bomb or microwave systems are to be preferred.
Self-made purest water can contain copper from copper pipes and cause false results.
Contamination can stem from contact of digestion acids with metal parts in the pressure system as well.
Good results can be obtained from ICP and also from graphite tube AAS.

The results from X-ray fluorescence are very good but this method is only recommendable for samples with higher copper contents.

3.11 Lead (pp 2-51, 3-21, 3-22)

The analysis of lead in foliar became much better during the last 4 ringtests. The percentage of outliers from the given limit of ± 30% decreased from 53 to 24 percent.

Digestion in closed systems (pressure or microwave digestion) followed by flameless-Aas, ICP- OES with USN or ICP-Ms seem to be recommendable.
X-ray fluorescent spectroscopy is only suitable for concentrations of > 1 µg/g Pb.

3.12 Cadmium (pp 2-56, 3-23, 3-24)

As stated for lead before, the overall result has to be considered very positive. About 20 % of the results lie outside the tolerance range of ± 30%. The error rate decreases drastically with the increase of the concentration. Only two laboratories (24, 36) delivered too high values for all samples. Apart from that single outliers dominate.
No particular digestion method is to be stated as being clearly of advantage. Flameless-AAS or ICP are the determination methods of choice. X-ray-spectroscopy is only useful for samples with Cd-contents > 2 µg Pb.

3.13 Boron (pp 2-61, 3-25, 3-26)

The results are very good. Boron has been determined by about half of the laboratories of which only one (36) delivered strongly deviating results with a photometric method after dry ashing.
Most laboratories used according to the suggestions the closed digestion with HNO_3 followed by ICP-OES.

3.16 Carbon (pp 2-66, 3-27, 3-28)

The results for the element Carbon are very disappointing. The number of laboratories which analysed C have doubled, but the percentage of outliers increased from 3 to 20 percent. It is obvious that many of the new elemental analysers are not well calibrated. This must be a duty of the concerned laboratories (2, 4, 6, 8, 9, 15, 39).

3.17 Sodium (pp 2-71, 3-29, 3-30)

Sodium is cancelled from the list of the optional elements by the expert panel (Tampere 2001). The data are given in the tables only for information. But it is of very interest that the

percentage of outliers decreased from 43% to 25%. It is obvious that only the use of closed digestion systems are suitable.

3.18 Aluminium (pp 2-76, 3-31.3-32)
Aluminium was cancelled from the list of the optional elements because only a minority of laboratories fulfil the instructions of the foliar manual to use HF for digestion. The data cannot be right and are given in the tables only for information.

4. Conclusions

The results of the 5th ringtest of ICP Forests show generally a good analytical quality in foliar analysis. But this is no matter of course as we have stated for carbon e.g.. A high standard must be elaborated each day by praxis and by a good quality control. This quality praxis must become a tradition for each laboratory and for each new member of the staff too.

The 5th ringtest confirm the conclusions of the last one: It is reasonable to restrict the allowed methods on a minimum:

4. Elemental analysers (for C, N and S)
5. HNO_3-digestions in closed systems (pressure bomb or microwave) in combination with ICP-OES or ICP-MS (for S, P, Ca, etc.) or Flameless-AAS (for Cu, Pb, Cd)
6. X-ray fluorescence analysis for S, P, Ca, Mg, K, Zn, Mn, and Cu, Pb, Cd, if the contents are not too low.

5. Literature

Bartels, U. (1996): ICP Forests 2nd Needle/Leaf Interlaboratory Test 95/96 Results

	Landesumweltamt NRW, October 1996
Bartels, U. (1998)	ICP Forests 3rd Needle/Leaf Interlaboratory Test 1997/98 Results North Rhine-Westphalia State Environment Agency , Essen In co-operation with: Austrian Federal Forest Research Centre, Vienna Bundesministerium f. Ernährung, Landwirtschaft und Forsten, Bonn
Bartels, U. (2000)	ICP Forests 4rd Needle/Leaf Interlaboratory Test 1999/00 Results North Rhine-Westphalia State Environment Agency , Essen In co-operation with: Austrian Federal Forest Research Centre, Vienna Bundesministerium f. Ernährung, Landwirtschaft und Forsten, Bonn
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 (1994/1999)	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 software ‚Ring 4.0'
Uhlig, St. (1995)	Ring 4.0 - Programm zur Auswertung von Ringversuchen (Manual)

ICP Forests Foliar Analysis Methods Code (2001/2002)

Pretreatments

P0 No information

P1 No pretreatment

P2 Extractions

P2.1 Extraction, H_2O
P2.2 Extraction. HNO_3
P2.2 Extraction, aqua regia

P3 Wet ashings at room pressure (open system)

P3.1 Wet ashing, HNO_3
P3.2 Wet ashing, HNO_3/HF
P3.3 Wet ashing, $HNO_3/HClO_4$
P3.4 Wet ashing, HNO3/$HClO_4$/HF
P3.5 Wet ashing HNO_3/H_2O_2
P3.6 Wet ashing $HNO_3/HClO_4$ /H_2SO_4
P3.7 Wet ashing, $HNO_3/HClO_4/CaCl_2$
P3.8 Wet ashing, $HNO_3/HClO_4/H_2O_2$
P3.9 wet ashing, HNO_3,/$HClO_4$/HCl
P3.10 Wet ashing, HNO_3 /H_2SO_4
P3.11 Wet ashing, aqua regia
P3.20 Wet ashing, $HClO_4/H_2O_2$
P3.21 Wet ashing, $HClO_4/H_2SO_4$
P3.31 Wet ashing, H_2SO_4/H_2O_2
P3.32 Wet ashing, H_2SO_4/K_2CrO_7
P3.50 Kjeldahl, H_2SO_4/ Se-catalyst
P3.51 Kjeldahl, H_2SO_4/Cu-catalyst
P3.52 Kjeldahl, H_2SO_4/Ti-Cu-catalyst
P3.53 Kjeldahl, H_2SO_4/Hg-catalyst

P4 Pressure digestions (closed system)

P4.1 Pressure digestion, HNO_3,
P4.2 Pressure digestion, HNO_3/HF
P4.3 Pressure digestion, $HNO_3/HClO_4$,
P4.4 Pressure digestion, $HNO_3/HClO_4$/HF,
P4.5 Pressure digestion, HNO_3/H_2O_2,

P5 Microwave pressure digestions (closed system)

P5.1 Microwave digestion, HNO_3,
P5.2 Microwave digestion, HNO_3/HF
P5.3 Microwave digestion, $HNO_3/HClO_4$
P5.4 Microwave digestion, $HNO_3/HClO_4$/HF
P5.5 Microwave digestion, HNO_3/H_2O_2,

P5.6 Microwave digestion, $HNO_3/H_2O_2/HF$
P5.7 Microwave digestion, $HNO_3/H_2O_2/HCl$
P5.8 Microwave aqua regia

P6 Dry ashings
P6.1 Dry ashing, dissolution with HNO_3
P6.2 Dry ashing, dissolution with $HNO_3/MgNO_3$
P6.3 Dry ashing, dissolution with HNO_3/HF
P6.4 Dry ashing, dissolution with HNO_3/HCl
P6.5 Dry ashing, dissolution with HCl
P6.6 Dry ashing, dissolution with HCl/HF
P6.7 Dry ashing, dissolution with H_2SO_4

P7 Oxygen ashings
P7.1 Oxygen ashing, Schöniger
P7.2 Oxygen ashing, Wickbold
P7.3 Oxygen ashing, calorimetric bomb

P9 X-ray-pretreatments and other pretreatments
P9.1 Material pressed (Pellet)
P9.2 Material melted and formed (tablet)
P9.5 Melting (NaOH)

Detections

D0 No information
D1 No detection

D10 Elemental-analyzers

D11 Kjeldahl-apparatus
D11.1 Kjeldahl-apparatus (Tecator)
D11.2 Kjeldahl-apparatus (Gerhardt)
D11.3 Kjeldahl-apparatus (Büchi)

D12 N-Analyzer
D12.1 N-Analyzer (Heraeus/Elementar)
D12.2 N-Analyzer (Vario)
D12.3 N-Analyzer (,Leco)

D13 C-Analyzer
D13.1 C-Analyzer (Leco)

D14 S-Analyzer
D14.1 S-Analyzer (Leco)

D15 C/N-Analyzer
D15.1 C/N-Analyzer (Carlo-Erba)
D15.2 C/N-Analyzer (Leco)
D15.3 C/N-Analyzer (Heraeus)
D15.4 C/N-Analyzer (Vario)

D16 C/S-Analyzer
D16.1 C/S-Analyzer (Leco)

D17 C/N/S-Analyzer
D17.1 C/N/S-Analyzer (Leco)
D17.2

D18 C/N/H-Analyzer
D18.1 C/N/H-Analyzer (Leco)
D18.2 C/H/N-Analyzer (Heraeus)

D20 Mono-Atom-Spectrometry-Techniques
D21 AAS-flame technique
D21.1 AAS-flame technique (C_2H_2/Air)
D21.2 AAS-flame technique (C_2H_2/N_2O)
D22 AAS-flameless technique
D24 AAS-hydride technique
D25 AAS-cold vapor technique

D26 AFS-hydride-technique

D28 AES-Flame photometer

D30 Multi-Atom-Spectrometry-techniques
D31 ICP-AES without Ultrasonic nebulisation
D32 ICP-AES with Ultrasonic nebulisation

D35 ICP-MS

D40 Physical techniques
D41 X-ray-energy dispersive
D42 X-ray-wavelength dispersive

D45 Neutron activation analysis (NAA)
D47 γ-spectroscopy

D50 UV-VIS-spectrophotometry-techniques

D51 Colorimetric N-Determination
D51.1 Indophenol-blue-method
D51.2 Flow Injection (FIAS) - NH_3-Membrane-diffusion, 566 nm
D51.3 Continuous flow method, Indophenol blue

D52 Colorimetric S-Determination
D52.1 $BaCl_2$-methods (Nephelometry)

D53 Colorimetric P-Determination
D53.1 Molybdene-blue-method
D53.2 Vanadium-Mo-blue-method
D53.3 Continuous flow method, Molybdene-blue

D54 Colorimetric B-Determination
D54.1 Azomethin - H
D54.2 Carmine

D60 Ion-chromatographic techniques

D61.1 Anion-Chromatography w. chemical suppression
D61.2 Anion-Chromatography w. electr. suppression
D62.1 Kation-Chromatography w. chemical suppression
D62.2 Kation-Chromatography w. electr. suppression

D70 Electrochemical methods

D71 Conductimetry
D71.1 Conductometric titration
D72 Potentiometry
D72.1 pH
D72.2 other ion selective elektrodes
D73 Potentiometric titrations
D74 Stripping potentiometry
D75 Voltammetry
D76 Polarography
D77 Amperometry
D78 Electrophoresis
D79 Redox potential

D80 Classical analytical techniques

D81 Gravimetry
D82 Titration
D82.1 NH_4-back titration
D82.2 Thiocyanate-titration
D82.3 $FeNH_4SO_4$-Titration
D82.4 Barimetric titration
D82.5 $AgNO_3$-Titration

D90 other detections

List of laboratories and responsible persons
(State: 15.08.2002)

Austria	Forstliche Bundesversuchsanstalt Pflanzenanalyse Seckendorff-Gudent-Weg 8 A-1131 Wien (Vienna)	Ing. Alfred Fürst
Belarus (no participation)	State Forest Inventory Enterprise „Belgosles“ 220089 Minsk	A.S. Pukhovsky
Belgium 1	Inst. for Forestry and Game Management Gaverstraat 4 B-9500 Geraardsbergen	Dr. Bruno. De Vos Carine Buysse
Belgium 2	Universite Catholique de Louvin Faculte´des sciences agronomiques Unite´ des eaux et forets Place Croix Du Sud 2/9 B-1348 Louvain-La-Neuve	Francois Piscaglia
Bulgaria	University of Forestry Ecology and Environm. Protection Kl. Ohridski st. 10 BG-1756 Sofia	Dr. Ekaterina Pavlova
Croatia	Forest Research Institute Department of Ecology Cvjetno naselje 41, HR-10450 Jastrebarsko	Dunja Novosel, BSc
Cyprus	Department of Agriculture Analytical Laboratories Louki Akrita AV. CY-1412 Nicosia	Dr. Panicos Hadjigeorgiou
Czech Republic	Forestry and Game Management Research Institute Jiloviste´-Strnady CZ-15604 Prague	Jarmila Zahornadska
Denmark	Danish Forest and Landscape Research Institute Hoersholm Kongeveij 11 DK-2970 Hoersholm	Annemarie Bastrup-Birk

Estonia	Tartu Environmental Research Akadeemia 4 EE-51003 Tartu	Mae Uri
Finland	The Finnish Forest Research Institute - Parkano Res. Station Kaironiementie 54 FIN-39700 Parkano	Dr. H. Raitio
France	INRA USRAVE B.P. 81 F-33883 Villenave D`Ornon	Alain Gomez
Germany 1	Landesumweltamt Nordrhein-Westfalen (LUA) Dienststelle Recklinghausen Leibnizstraße 10 D-45659 Recklinghausen	Dipl.-Ing. G. Jansen Dipl.-In'in G. Cousen
Germany 2	Untersuchungszentrum Münster LUFA Nevinghoff 40 48147 Münster	Dipl. Ing'in Anne Werning
Germany 3	Institut für Bodenkunde und Waldernährung Büsgenweg 2 D-37077 Göttingen	PD Dr. Norbert Lamersdorf
Germany 4	Landwirtschaftliche Untersuchungs- und Forschungsanstalt Speyer Obere Langgasse 40 D-67346 Speyer	Dr. K. Wies
Germany 5	Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg Wonnhaldestraße 4 D-79100 Freiburg	Gabriele Trefz-Malcher
Germany 6	Niedersächsische Forstliche Versuchsanstalt Grätzelstraße 2 D-37079 Göttingen	N. König

Germany 7	Bundesanstalt für Geo- wissenschaften und Rohstoffe (BGR) Postfach 510153 D-30631 Hannover	Dr. Utermann
Germany 8	Landeslabor Schleswig-Holstein Saarbrückenstraße 38 24114 Kiel	Th. Nack
Germany 9	Sächsische Landesanstalt für Forsten Labor Abt. Bodenkunde/Waldernährung Bonnewitzer Str. 34 D-01796 Pirna OT Graupa	F. Symossek
Germany 10	Bayerische Landesanstalt für Wald und Forstwirtschaft Am Hochanger 11 D-85354 Freising	Dr. Uwe Blum
Germany 11	Technische Universität Dresden Institut für Bodenkunde und Standortslehre Pienner Str. 7 D-01737 Tharandt	Dr. Th. Klinger
Germany 12	Landwirtschaftliche Untersuchungs- und Forschungsanstalt Graf.Lippe-Str. 1 D-18059 Rostock	Dr. W. Sarich
Germany 13	Thüringer Landesanstalt für Landwirtschaft Naumburger Str. 98 D-07743 Jena	Dr. M. Leiterer
Germany 13a	Thüringer Landesanstalt f. Landwirtschaft Ref. Futtermittel Naumburger Str. 98 D-07743 Jena	Dipl-Chem. Bargholz
Germany 14	Hessisches Dienstleistungszentrum für Landwirtschaft, Gartenbau u. Naturschutz Am Versuchsfeld 13 D-34128 Kassel	Dr. R. Ellinghaus
Germany 15	Institut für Bodenökologie	Dr. H.

	und Umweltbewertung Am Teeberg 5 D-29581 Gerdau / Bohlsen	Meier-Spasche
Germany 16	Forstliche Forschungsanstalt Eberswalde Alfred-Möller-Str. 1 D-16225 Eberswalde	Dr. L. Reichelt
Germany 17	Universität des Saarlandes Physische Geographie Zeile 2 D-66125 Saarbrücken	Dr. Wannemacher Dr. C. Gerber
Germany 18	Lehrstuhl für Bodenkunde und Standortlehre Techn. Univ. München Am Hochanger 13 D-85354 Freising	Günter Bartonek
Germany 19 (no Participation)	Ökologie-Zentrum Kiel d. Christian-Albrechts-Universität Schaumburger Str. 112 D-24118 Kiel	Dr. C. Schimmig
Germany 20	Landesanstalt für Landwirtschaft und Gartenbau-Standort Halle Schiepziger Str. 29 06120 Halle (Saale)	R. Schwarzer
Germany 21 (new participant) for the 6th ringtest)	Forschungsinstitut für Bergbaufolgeland- schaften e.V. – Analytisches Labor Brauhausweg 2 03238 Finsterwalde	Herr Sawinski
Greece	Forest Research Institute Forest Soils Terma Alkmanos GR-11528 Athens	Dr. P. Michopoulos
Hungary	Forest Research Institute Várkerület 30/a H-9601 Sárvàr	Julianna Papp
Iceland	no participation	
Ireland	Coillte Teoranta Coillte Laboratory	Dr. Philip O'Dea

	Newtownmountkennedy Co. Wicklow	
Italy 1	Dipartomento di science Ambientali Via P.A. Mattioli, 4 I-53100 Siena	Prof. Dr. C. Leonizio Dr.ssa Moira Bianconi
Italy 2	Dept. of Forest Environment and Resources Disafri Univ. of Tuscia - Viterbo Via dell' Industria, 24 I-00057 Maccarese - Roma	Prof. Giuseppe Scarasci Mugnozza
Italy 3 (no participation)	Versuchszentrum Laimburg Agrikulturchemisches Laboratorium I-39040 Auer (BZ)	Meinhard Aichner
Latvia	Latvian Meteorological Agency LV 1019 Maskavas str., 165 RIGA Latvia/Lettland	Mendel Laznik
Lithuania	Lithuanian Forest Research Institute KAUNAS distr. Lit-4312 Girionys	Dr.Laima Skuodiene
Luxemburg	represented by France	
Norway	NISK Norwegian Forest Research Inst. Hogskoleveien 12 N-1432 As	Line Roed
Poland	Forest Research Institute Chemical Laboratory Sekocin Las PL-05-090 Raszyn	Josef Wojcik
Portugal	Estacao Florestal Nacional Laboratorio de Quimica Rua Do Borja N° 2 P-1399-051 Lisboa	Isabel Evaristo
Romania	Institutul De Cercetari si Amenajari Silvice (ICAS) Sos. Stefanesti 128 sector 2 RO-72904 Bucaresti	Chem. Aurelia Surdu

Russia	Water Research and Control Center 7/9, Universitetskaya RUS-199034 Sankt-Petersburg	Dr. Galina Glouchtchenkova
Slovenia	Slovenian Forestry Institute Laboratory for Forest Ecology Vecna Pot 2 SLO-61000 Ljubljana	Polona Kalan,Ph.D.
Slovakia 1	Forest Research Institute T.G.Masaryka st. 22 SK-960 92 Zvolen	Ing. Jarmila Zahornadska
Spain	INIA Departamento Medio Ambiente Apdo. 8111 E-28080 Madrid	Dr. Maria R. Gonzalez Cascon
Sweden (no participation)	Department of Forest Genetics and Plant Physiology Swedish Univ. of Agricult. Sci. S-90183 UMEA	T. Näsholm
Switzerland	Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) Zürcherstrasse 111 CH-8903 Birmensdorf	D. Pezzota
The Netherlands	Alterra BLGG Oosterbeek Postbox 47 NL-6700 AA Wageningen	Dr. A.F.M. Olsthhoorn
Ukraine	Ukrainian Forestry Research Institut Lab. of Forest Monitoring and Radioecology Pushkinskaya 86 UKR-61024 Kharkiv	Dr.Igor Buksha
United Kingdom	Forestry Research Agency Environmental Research Alice Holt Lodge Wrecclesham Farnham UK-Surrey GU 10 4 LH	E. Ward

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**14**	P1	D11.2	9.90	ab	10.32	a	10.40	a	**10,32**	*	0,27	2,62
2	**18**	P3.31	D51.2	10.90	a	10.50	ab	10.80	a	**10,80**	*	0,21	1,94
3	**7**	P1	D15	11.30	ab	11.50	a	11.50	a	**11,47**		0,12	1,05
4	**16**	P1	D11.2	11.40	a	12.00	ab	11.50	a	**11,50**		0,32	2,78
5	**51**	P1	D11	11,62		11,69		11,65		**11,65**		0,04	0,34
6	**2**	P3.50	D51	11.40	b	11,90		11,80		**11,80**		0,26	2,20
7	**41**	P1	D15.4	12.69	b	11,82		11,87		**11,88**		0,49	4,12
8	**4**	P1	D17.1	12.10	b	11,80		11,90		**11,90**		0,15	1,26
9	**5**	P1	D11.1	12,04		11,99		11,97		**12,00**		0,04	0,33
10	**52**	P1	D15.2	12,00		12,10		11,95		**12,01**		0,08	0,67
11	**36**	P3.51	D82	12,09		12.32	b	11,98		**12,09**		0,17	1,41
12	**29**	P1	D14.1	12,17		12,16		12,16		**12,16**		0,01	0,08
13	**43**	P1	D13.1	12,20		12,20		12,20		**12,20**		0,00	0,00
14	**40**	P1	D10	12,16		12,23		12,25		**12,21**		0,05	0,41
15	**25**	P1	D12.3	12,20		12,30		12,20		**12,23**		0,06	0,49
16	**50**	P1	D10	10.58	b	12,25		12.53	b	**12,25**		1,05	8,57
17	**30**	P1	D11.3	12,31		12,31		12,33		**12,32**		0,01	0,08
18	**10**	P3.50	D82	12.17	b	12.48	b	12,33		**12,33**		0,16	1,30
19	**17**	P3.50	D51	12,39		12,31		12,42		**12,37**		0,06	0,49
20	**9**	P1	D11.2	12,43		12,38		12,36		**12,39**		0,04	0,32
21	**54**	P1	D11	12,44		12,37		12,39		**12,40**		0,04	0,32
22	**13**	P1	D17.1	12,51		12,41		12,30		**12,41**		0,11	0,89
23	**8**	P1	D15	12,50		12,40		12,40		**12,43**		0,06	0,48
24	**12**	P1	D17.1	12,38		12,45		12,45		**12,43**		0,04	0,32
25	**48**	P1	D10	12,48		12,43		12,46		**12,46**		0,03	0,24
26	**23**	P1	D11	12.60	b	12.35	b	12,47		**12,47**		0,13	1,04
27	**24**	P1	D11.3	12,54		12,49		12,39		**12,48**		0,08	0,64
28	**44**	P1	D10	12,60		12,71		12,50		**12,60**		0,11	0,87
29	**37**	P1	D10	12,61		12,66		12,63		**12,63**		0,03	0,24
30	**1**	P3.50	D82	12,75		12,75		12.47	b	**12,72**		0,16	1,26
31	**28**	P3.31	D51.2	12,78		12,79		12.52	b	**12,75**		0,15	1,18
32	**42**	P1	D10	13.30	b	12,76		12.42	b	**12,76**		0,44	3,45
33	**55**	P1	D10	12,89		12,82		12,92		**12,88**		0,05	0,39
34	**3**	P1	D17.1	12,89		12,96		12,83		**12,89**		0,07	0,54
35	**27**	P1	D11.1	12,93		12,86		12,91		**12,90**		0,04	0,31
36	**45**	P0	D0	13,03		12.64	b	13,02		**12,99**		0,22	1,69
37	**39**	P1	D11	12,90		13,00		13.22	b	**13,00**		0,16	1,23
38	**38**	P1	D10	13,00		13,10		13,10		**13,07**		0,06	0,46
39	**19**	P1	D10	13,12		13,02		13,16		**13,11**		0,07	0,53
40	**15**	P1	D17.1	13,07		13,15		13.50	b	**13,15**		0,23	1,75
41	**47**	P1	D15.4	13,45		13,35		13,40		**13,40**		0,05	0,37
42	**6**	P1	D15	13.44	ab	13.91	ab	13.59	a	**13,59**		0,24	1,77
43	**11**	P1	D11.1	13.86	a	13.36	ab	14.00	ab	**13,86**	*	0,34	2,45
44	**20**	P1	D18.1	14.60	a	14.45	a	14.45	a	**14,48**	*	0,09	0,62
45	**35**	P3.21	D11	14.75	ab	14.36	ab	14.61	a	**14,61**	*	0,20	1,37
46	**26**	P3.31	D51	15.28	a	14.96	ab	15.92	ab	**15,28**	*	0,49	3,21
47	**46**	P1	D15.3	18.46	ab	16.91	ab	17.52	a	**17,52**	*	0,78	4,45

Mean	Interlab.std. deviation	
	abs.	rel.%
12,53	**0,17**	**1,33**

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

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **14,9**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **N**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**5**	P1	D11.1	8.37	a	7.67	ab	8.38	a	**8,34** *	0,41	4,92
2	**18**	P3.31	D51.2	9.60	a	9.70	a	9.50	a	**9,60** *	0,10	1,04
3	**14**	P1	D11.2	9.87	ab	10.80	ab	10.47	a	**10,47** *	0,47	4,49
4	**7**	P1	D15	10.80	a	11.10	ab	10.70	a	**10,80**	0,21	1,94
5	**16**	P1	D11.2	10.70	a	10.80	a	10.90	a	**10,80**	0,10	0,93
6	**51**	P1	D11	11.13	ab	10.92	a	10.99	a	**10,99**	0,11	1,00
7	**52**	P1	D15.2	11,08		11,09		11,15		**11,11**	0,04	0,36
8	**2**	P3.50	D51	11,20		11,20		11.50	b	**11,23**	0,17	1,51
9	**4**	P1	D17.1	11,30		11,30		11,40		**11,33**	0,06	0,53
10	**40**	P1	D10	11,46		11,35		11,29		**11,35**	0,09	0,79
11	**8**	P1	D15	11,40		11,30		11,50		**11,40**	0,10	0,88
12	**11**	P1	D11.1	11.03	b	11,47		11.64	b	**11,47**	0,31	2,70
13	**29**	P1	D14.1	11,50		11,48		11,44		**11,47**	0,03	0,26
14	**43**	P1	D13.1	11,50		11,50		11,40		**11,47**	0,06	0,52
15	**50**	P1	D10	11.01	b	11,54		11.88	b	**11,54**	0,44	3,81
16	**42**	P1	D10	11,70		11,60		11.40	b	**11,60**	0,15	1,29
17	**48**	P1	D10	11,66		11,65		11,53		**11,62**	0,07	0,60
18	**54**	P1	D11	11,62		11,59		11,66		**11,62**	0,04	0,34
19	**12**	P1	D17.1	11.51	b	11,67		11,69		**11,65**	0,10	0,86
20	**24**	P1	D11.3	11.50	b	11,75		11,67		**11,67**	0,13	1,11
21	**25**	P1	D12.3	11,70		11,80		11,60		**11,70**	0,10	0,85
22	**36**	P3.51	D82	12.00	b	11,65		11,70		**11,71**	0,19	1,62
23	**26**	P3.31	D51	13.13	b	11.59	b	11,72		**11,72**	0,85	7,25
24	**13**	P1	D17.1	11,76		11,76		11,65		**11,73**	0,06	0,51
25	**17**	P3.50	D51	11,74		11,78		11,78		**11,77**	0,02	0,17
26	**9**	P1	D11.2	11,77		11,74		11,90		**11,79**	0,09	0,76
27	**28**	P3.31	D51.2	12.05	b	11.59	b	11,80		**11,80**	0,23	1,95
28	**44**	P1	D10	11,84		11,84		11.62	b	**11,81**	0,13	1,10
29	**19**	P1	D10	11,94		11,83		11,81		**11,85**	0,07	0,59
30	**20**	P1	D18.1	11.55	b	11,85		12.35	b	**11,85**	0,40	3,38
31	**37**	P1	D10	11,90		11,92		11,95		**11,92**	0,03	0,25
32	**41**	P1	D15.4	12.42	b	11.63	b	11,92		**11,92**	0,40	3,36
33	**30**	P1	D11.3	11,94		11,94		11,91		**11,93**	0,02	0,17
34	**23**	P1	D11	11,94		12.12	b	11,97		**11,99**	0,10	0,83
35	**27**	P1	D11.1	12,03		12,05		12,05		**12,04**	0,01	0,08
36	**35**	P3.21	D11	12,08		11,99		12,04		**12,04**	0,05	0,42
37	**55**	P1	D10	12,03		12,00		12,11		**12,05**	0,06	0,50
38	**45**	P0	D0	12,09		12,10		12,20		**12,13**	0,06	0,49
39	**3**	P1	D17.1	12,11		12,10		12.42	b	**12,14**	0,18	1,48
40	**38**	P1	D10	12,20		12,20		12,30		**12,23**	0,06	0,49
41	**15**	P1	D17.1	12.06	b	12,31		12,29		**12,27**	0,14	1,14
42	**39**	P1	D11	12,28		12,18		12,39		**12,28**	0,11	0,90

ICP-Forests 5th needle/leaf labtest 01/02

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	**18**	P3.31	D51.2	11.60	a	11.70	a	11.70	a	**11,68**	*	0,06	0,51
2	**14**	P1	D11.2	12.40	a	12.70	ab	11.39	ab	**12,40**	*	0,69	5,56
3	**16**	P1	D11.2	12.60	a	12.50	a	12.40	a	**12,50**	*	0,10	0,80
4	**5**	P1	D11.1	12,99		13.28	b	12.61	b	**12,99**		0,34	2,62
5	**51**	P1	D11	13.37	b	12.95	b	13,16		**13,16**		0,21	1,60
6	**7**	P1	D15	13,20		13,20		13,20		**13,20**		0,00	0,00
7	**52**	P1	D15.2	13,30		13,30		13.00	b	**13,28**		0,17	1,28
8	**40**	P1	D10	13,33		13,39		13,37		**13,36**		0,03	0,22
9	**4**	P1	D17.1	13,40		13,50		13,50		**13,48**		0,06	0,45
10	**43**	P1	D13.1	13,50		13,40		13,50		**13,48**		0,06	0,45
11	**42**	P1	D10	13,52		13,51		13,49		**13,51**		0,02	0,15
12	**2**	P3.50	D51	13,60		13,50		13,50		**13,52**		0,06	0,44
13	**41**	P1	D15.4	13.83	b	13,52		13,55		**13,56**		0,17	1,25
14	**36**	P3.51	D82	13.83	b	13.50	b	13,61		**13,61**		0,17	1,25
15	**13**	P1	D17.1	13,62		13.51	b	13.73	b	**13,62**		0,11	0,81
16	**8**	P1	D15	13,60		13,70		13,70		**13,68**		0,06	0,44
17	**29**	P1	D14.1	13,66		13,70		13,68		**13,68**		0,02	0,15
18	**30**	P1	D11.3	13,71		13,70		13,70		**13,70**		0,01	0,07
19	**12**	P1	D17.1	13,74		13,68		13,71		**13,71**		0,03	0,22
20	**24**	P1	D11.3	13,65		13,81		13,72		**13,72**		0,08	0,58
21	**48**	P1	D10	13,83		13,72		13,71		**13,74**		0,07	0,51
22	**50**	P1	D10	13.57	b	13,83		13,79		**13,79**		0,14	1,02
23	**23**	P1	D11	13.71	b	13,90		13,91		**13,88**		0,11	0,79
24	**20**	P1	D18.1	13,90		13,95		13.50	b	**13,90**		0,25	1,80
25	**44**	P1	D10	13,90		14.01	b	13.79	b	**13,90**		0,11	0,79
26	**9**	P1	D11.2	13.83	b	14,00		14,07		**14,00**		0,12	0,86
27	**17**	P3.50	D51	14,01		13,99		14.13	b	**14,02**		0,08	0,57
28	**25**	P1	D12.3	14,10		14,00		14,00		**14,02**		0,06	0,43
29	**37**	P1	D10	14,00		14,10		14,20		**14,10**		0,10	0,71
30	**10**	P3.50	D82	14,11		14,11		14,11		**14,11**		0,00	0,00
31	**45**	P0	D0	14,14		14.00	b	14,19		**14,14**		0,10	0,71
32	**54**	P1	D11	14,16		14,11		14,19		**14,15**		0,04	0,28
33	**28**	P3.31	D51.2	14,30		14,27		14,36		**14,31**		0,05	0,35
34	**55**	P1	D10	14,35		14.21	b	14,33		**14,32**		0,08	0,56
35	**3**	P1	D17.1	14,26		14,33		14.44	b	**14,33**		0,09	0,63
36	**1**	P3.50	D82	14.78	b	14,35		14.00	b	**14,35**		0,39	2,72
37	**11**	P1	D11.1	13.87	b	14,35		14,41		**14,35**		0,30	2,09
38	**27**	P1	D11.1	14,37		14,39		14,37		**14,38**		0,01	0,07
39	**26**	P3.31	D51	14,39		14.86	b	14,33		**14,39**		0,29	2,02
40	**39**	P1	D11	14.31	b	14,42		14.73	b	**14,42**		0,22	1,53
41	**38**	P1	D10	14,50		14,50		14,40		**14,48**		0,06	0,41
42	**47**	P1	D15.4	14,50		14,49		14,45		**14,48**		0,03	0,21
43	**19**	P1	D10	14,67		14,58		14,51		**14,58**		0,08	0,55
44	**35**	P3.21	D11	14.99	ab	14.84	a	14.78	a	**14,84**		0,11	0,74
45	**6**	P1	D15	15.12	a	14.96	ab	15.12	a	**15,10**		0,09	0,60
46	**15**	P1	D17.1	14.93	ab	15.18	a	15.14	a	**15,14**		0,13	0,86
47	**46**	P1	D15.3	17.29	ab	18.40	a	18.44	a	**18,40**	*	0,65	3,53

Mean	Interlab.std. deviation	
	abs.	rel.%
13,91	**0,13**	**0,94**

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

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,5**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **N**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**14**	P1	D11.2	17.01	ab	17.26	a	17.58	ab	**17,26**	*	0,29	1,68
2	**18**	P3.31	D51.2	17.30	a	17.40	a	17.70	ab	**17,40**	*	0,21	1,21
3	**16**	P1	D11.2	18.30	ab	18.10	a	18.00	a	**18,10**		0,15	0,83
4	**51**	P1	D11	18,83		18,76		18,79		**18,79**		0,04	0,21
5	**2**	P3.50	D51	19.50	b	19,00		18.70	b	**19,00**		0,40	2,11
6	**30**	P1	D11.3	18,96		18,96		19,08		**19,00**		0,07	0,37
7	**5**	P1	D11.1	19.37	b	19,08		18.60	b	**19,08**		0,39	2,04
8	**40**	P1	D10	19,29		19,14		19,07		**19,15**		0,11	0,57
9	**36**	P3.51	D82	19,10		19,21		19.43	b	**19,21**		0,17	0,88
10	**41**	P1	D15.4	19,36		19.14	b	19,52		**19,36**		0,19	0,98
11	**35**	P3.21	D11	19.76	b	19,31		19,43		**19,43**		0,23	1,18
12	**4**	P1	D17.1	19,40		19,40		19,60		**19,44**		0,12	0,62
13	**43**	P1	D13.1	19,50		19,50		19,40		**19,47**		0,06	0,31
14	**1**	P3.50	D82	19,46		19.85	b	19,43		**19,49**		0,23	1,18
15	**7**	P1	D15	19,50		20.00	b	19.20	b	**19,50**		0,40	2,05
16	**29**	P1	D14.1	19,59		19,55		19,53		**19,56**		0,03	0,15
17	**52**	P1	D15.2	19,70		19,60		19,50		**19,60**		0,10	0,51
18	**42**	P1	D10	19,47		19,61		19,73		**19,61**		0,13	0,66
19	**13**	P1	D17.1	19.95	b	19,73		19,73		**19,77**		0,13	0,66
20	**12**	P1	D17.1	19,87		19,89		19,85		**19,87**		0,02	0,10
21	**24**	P1	D11.3	19,79		19,96		19,87		**19,87**		0,09	0,45
22	**54**	P1	D11	20,01		19,94		20,03		**19,99**		0,05	0,25
23	**25**	P1	D12.3	20,00		19.00	b	21.00	b	**20,00**		1,00	5,00
24	**20**	P1	D18.1	19.73	b	20,03		20.27	b	**20,03**		0,27	1,35
25	**8**	P1	D15	19.70	b	20,10		20,10		**20,06**		0,23	1,15
26	**17**	P3.50	D51	20,08		20,15		20,07		**20,10**		0,04	0,20
27	**50**	P1	D10	19.57	b	20,13		20,23		**20,13**		0,36	1,79
28	**45**	P0	D0	20,17		20,15		20.81	b	**20,20**		0,38	1,88
29	**48**	P1	D10	20,24		20,13		20.46	b	**20,24**		0,17	0,84
30	**9**	P1	D11.2	20,34		20,34		20,32		**20,33**		0,01	0,05
31	**28**	P3.31	D51.2	19.88	b	20,53		20,47		**20,46**		0,36	1,76
32	**44**	P1	D10	20,54		20.86	b	20.32	b	**20,54**		0,27	1,31
33	**37**	P1	D10	20,47		20,60		20,57		**20,55**		0,07	0,34
34	**10**	P3.50	D82	20.87	b	20.28	b	20,57		**20,57**		0,30	1,46
35	**6**	P1	D15	20.44	b	20,63		20,71		**20,63**		0,14	0,68
36	**27**	P1	D11.1	20,61		20,65		20,62		**20,63**		0,02	0,10
37	**23**	P1	D11	20,61		20,65		20,73		**20,66**		0,06	0,29
38	**3**	P1	D17.1	20,77		20,68		20,72		**20,72**		0,05	0,24
39	**38**	P1	D10	20,80		20,80		20,80		**20,80**		0,00	0,00
40	**39**	P1	D11	20,89		20,79		21.11	b	**20,89**		0,16	0,77
41	**55**	P1	D10	21,00		20.70	b	20,92		**20,92**		0,16	0,76
42	**47**	P1	D15.4	21,42		21,36		21,45		**21,41**		0,05	0,23
43	**11**	P1	D11.1	20.82	ab	21.46	a	21.75	ab	**21,46**		0,48	2,24
44	**19**	P1	D10	21.42	a	21.50	a	21.45	a	**21,46**		0,04	0,19
45	**26**	P3.31	D51	21.41	ab	22.21	ab	21.60	a	**21,60**		0,42	1,94
46	**15**	P1	D17.1	22.18	a	21.85	a	22.01	a	**22,01**		0,17	0,77
47	**46**	P1	D15.3	24.03	a	23.36	ab	25.94	ab	**24,03**	*	1,34	5,58

Mean	Interlab.std. deviation	
	abs.	rel.%
20,04	**0,22**	**1,06**

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

*** =not tolerable mean because more than +/- 10 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,4**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**5**	P6.2	D52.1	0.77	a	0.76	a	0.76	a	**0,76**	*	0,01	1,32
2	**30**	P3.9	D52.1	1.10	a	1.12	a	1.11	a	**1,11**		0,01	0,90
3	**16**	P5.5	D31	1.15	a	1.09	ab	1.13	a	**1,13**		0,03	2,65
4	**13**	P1	D17.1	1.12	b	1,16		1,17		**1,15**		0,03	2,61
5	**26**	P5.1	D35	1.00	b	1.30	b	1,15		**1,15**		0,15	13,04
6	**46**	P5.2	D31	1,16		1,15		1,14		**1,15**		0,01	0,87
7	**51**	P9.1	D42	1,15		1,16		1,17		**1,16**		0,01	0,86
8	**36**	P6.5	D52.1	1.26	b	1.16	b	1,19		**1,19**		0,05	4,20
9	**19**	P1	D10	1,22		1.28	b	1.18	b	**1,22**		0,05	4,10
10	**28**	P6	D60	1,23		1,24		1,23		**1,23**		0,01	0,81
11	**4a**	P9.1	D41	1,24		1,23		1,24		**1,24**		0,01	0,81
12	**9**	P5.5	D31	1,23		1,24		1,25		**1,24**		0,01	0,81
13	**14**	P4.1	D31	1,23		1,23		1,25		**1,24**		0,01	0,81
14	**6**	P3.2	D31	1,26		1,24		1,24		**1,25**		0,01	0,80
15	**20**	P1	D16.1	1,25		1,23		1,26		**1,25**		0,02	1,60
16	**45**	P5.5	D31	1,26		1,26		1,25		**1,26**		0,01	0,79
17	**47**	P4.1	D32	1,27		1,28		1,27		**1,27**		0,01	0,79
18	**49**	P1	D10	1,26		1,27		1,28		**1,27**		0,01	0,79
19	**7**	P5.5	D31	1,28		1,27		1,29		**1,28**		0,01	0,78
20	**10**	P3.3	D82	1.22	b	1.34	b	1,28		**1,28**		0,06	4,69
21	**44**	P4.1	D31	1,27		1,28		1,30		**1,28**		0,02	1,56
22	**50**	P4.1	D31	1,27		1,26		1.30	b	**1,28**		0,02	1,56
23	**54**	P3.2	D31	1,27		1,29		1,27		**1,28**		0,01	0,78
24	**55**	P5.5	D31	1,28		1,30		1,27		**1,28**		0,02	1,56
25	**1**	P1	D14.1	1.25	b	1,29		1,31		**1,29**		0,03	2,33
26	**39**	P5.5	D31	1,27		1,31		1,29		**1,29**		0,02	1,55
27	**42**	P4.1	D31	1,29		1,28		1,29		**1,29**		0,01	0,78
28	**2**	P5.3	D31	1,30		1,30		1,30		**1,30**		0,00	0,00
29	**11**	P5.1	D31	1,30		1,28		1,31		**1,30**		0,02	1,54
30	**12**	P5.1	D31	1.33	b	1,29		1,30		**1,31**		0,02	1,53
31	**25**	P1	D14.1	1,32		1,30		1,32		**1,31**		0,01	0,76
32	**8**	P3.2	D31	1,32		1.35	b	1.29	b	**1,32**		0,03	2,27
33	**38a**	P9.1	D42	1,33		1,34		1,32		**1,33**		0,01	0,75
34	**40**	P3.11	D31	1,31		1.35	b	1,32		**1,33**		0,02	1,50
35	**4**	P5.1	D31	1,34		1.37	b	1.29	b	**1,34**		0,04	2,99
36	**55a**	P9.1	D42	1,33		1,35		1,34		**1,34**		0,01	0,75
37	**17**	P5.1	D32	1,35		1.39	b	1.32	b	**1,35**		0,04	2,96
38	**43**	P4.1	D31	1,35		1,34		1,35		**1,35**		0,01	0,74
39	**3**	P1	D16.1	1.39	b	1.33	b	1,36		**1,36**		0,03	2,21
40	**48**	P4.1	D31	1,36		1,36		1,35		**1,36**		0,01	0,74
41	**41**	P4.1	D31	1,37		1,36		1.41	b	**1,38**		0,03	2,17
42	**18**	P5	D31	1,40		1,40		1,40		**1,40**		0,00	0,00
43	**37a**	P9.1	D42	1.48	a	1.51	ab	1.46	a	**1,48**		0,03	2,03
44	**24**	P3.3	D52.1	1.60	ab	1.52	ab	1.55	a	**1,55**		0,04	2,58
45	**29**	P3.3	D31	1.56	a	1.56	a	1.49	ab	**1,55**		0,04	2,58
46	**37**	P5.1	D31	1.65	ab	1.69	a	1.68	a	**1,67**	*	0,02	1,20
47	**38**	P5.5	D31	1.69	a	1.69	a	1.69	a	**1,69**	*	0,00	0,00
48	**23**	P3.3	D52	1.74	a	1.87	ab	1.60	ab	**1,74**	*	0,14	8,05
49	**15**	P1	D17.1	1.78	a	1.73	ab	1.80	a	**1,78**	*	0,04	2,25
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,29		**0,03**	**1,91**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **10,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **S**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**5**	P6.2	D52.1	0.42	a	0.43	ab	0.36	ab	**0,42**	*	0,04	9,52
2	**10**	P3.3	D82	0.55	ab	0.56	a	0.57	ab	**0,56**	*	0,01	1,79
3	**30**	P3.9	D52.1	0.61	ab	0.64	ab	0.63	a	**0,63**	*	0,02	3,17
4	**36**	P6.5	D52.1	0.62	ab	0.67	a	0.68	ab	**0,67**	*	0,03	4,48
5	**16**	P5.5	D31	0.72	a	0.73	ab	0.72	a	**0,72**		0,01	1,39
6	**28**	P6	D60	0.73	ab	0.72	a	0.72	a	**0,72**		0,01	1,39
7	**47**	P4.1	D32	0,77		0,77		0,77		**0,77**		0,00	0,00
8	**14**	P4.1	D31	0.69	b	0,78		0.81	b	**0,78**		0,06	7,69
9	**39**	P5.5	D31	0.80	b	0.76	b	0,78		**0,78**		0,02	2,56
10	**12**	P5.1	D31	0,79		0,79		0.83	b	**0,79**		0,02	2,53
11	**46**	P5.2	D31	0.80	b	0.77	b	0,79		**0,79**		0,02	2,53
12	**2**	P5.3	D31	0,80		0.90	b	0,80		**0,80**		0,06	7,50
13	**13**	P1	D17.1	0.82	b	0,81		0.74	b	**0,81**		0,04	4,94
14	**49**	P1	D10	0.87	b	0,81		0,81		**0,81**		0,03	3,70
15	**54**	P3.2	D31	0,81		0,81		0.80	b	**0,81**		0,01	1,23
16	**45**	P5.5	D31	0.81	b	0,82		0,82		**0,82**		0,01	1,22
17	**55**	P5.5	D31	0,82		0.83	b	0,82		**0,82**		0,01	1,22
18	**4a**	P9.1	D41	0.84	b	0,83		0.82	b	**0,83**		0,01	1,20
19	**6**	P3.2	D31	0,83		0.82	b	0.84	b	**0,83**		0,01	1,20
20	**26**	P5.1	D35	0.85	b	0.81	b	0,83		**0,83**		0,02	2,41
21	**42**	P4.1	D31	0,83		0,83		0.84	b	**0,83**		0,00	0,00
22	**44**	P4.1	D31	0,83		0.84	b	0,83		**0,83**		0,01	1,20
23	**25**	P1	D14.1	0,84		0,84		0.85	b	**0,84**		0,01	1,19
24	**29**	P3.3	D31	0.89	b	0.83	b	0,84		**0,84**		0,03	3,57
25	**41**	P4.1	D31	0,84		0.85	b	0.83	b	**0,84**		0,01	1,19
26	**51**	P9.1	D42	0.81	b	0,84		0,84		**0,84**		0,02	2,38
27	**7**	P5.5	D31	0,85		0.83	b	0,85		**0,85**		0,01	1,18
28	**17**	P5.1	D32	0,85		0,85		0.82	b	**0,85**		0,02	2,35
29	**24**	P3.3	D52.1	0,85		0.87	b	0,85		**0,85**		0,01	1,18
30	**43**	P4.1	D31	0,85		0.86	b	0,85		**0,85**		0,01	1,18
31	**50**	P4.1	D31	0.84	b	0,85		0.87	b	**0,85**		0,02	2,35
32	**4**	P5.1	D31	0.85	b	0,86		0.91	b	**0,86**		0,03	3,49
33	**8**	P3.2	D31	0.84	b	0.88	b	0,86		**0,86**		0,02	2,33
34	**20**	P1	D16.1	0,86		0,86		0.87	b	**0,86**		0,01	1,16
35	**40**	P3.11	D31	0,86		0.87	b	0.85	b	**0,86**		0,01	1,16
36	**48**	P4.1	D31	0,86		0,86		0.85	b	**0,86**		0,01	1,16
37	**9**	P5.5	D31	0.85	b	0,87		0,87		**0,87**		0,01	1,15
38	**38a**	P9.1	D42	0,88		0,88		0.87	b	**0,88**		0,01	1,14
39	**55a**	P9.1	D42	0,88		0.89	b	0.85	b	**0,88**		0,02	2,27
40	**11**	P5.1	D31	0,89		0.88	b	0.90	b	**0,89**		0,01	1,12
41	**18**	P5	D31	0,90		0,90		0,90		**0,90**		0,00	0,00
42	**3**	P1	D16.1	0,92		0,92		0.91	b	**0,92**		0,01	1,09
43	**23**	P3.3	D52	0.94	b	0,92		0.80	b	**0,92**		0,08	8,70
44	**1**	P1	D14.1	0.95	ab	0.94	a	0.93	ab	**0,94**		0,01	1,06
45	**19**	P1	D10	1.05	ab	1.15	ab	1.08	a	**1,08**	*	0,05	4,63
46	**37a**	P9.1	D42	1.10	ab	1.15	ab	1.12	a	**1,12**	*	0,03	2,68
47	**37**	P5.1	D31	1.18	ab	1.20	a	1.22	ab	**1,20**	*	0,02	1,67
48	**15**	P1	D17.1	1.19	ab	1.26	ab	1.23	a	**1,23**	*	0,04	3,25
49	**38**	P5.5	D31	1.28	a	1.29	ab	1.26	ab	**1,28**	*	0,02	1,56
										Mean		Interlab.std. deviation	
												abs.	rel.%
										0,84		**0,02**	**2,43**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **18,4**
Mean of 3rd Needle/Leaf Test 97/98 Sample 2: **0,86**

ICP-Forests 5th needle/leaf labtest 01/02

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	**30**	P3.9	D52.1	0.68	a	0.70	a	0.67	a	**0,68**	*	0,02	2,94
2	**36**	P6.5	D52.1	0.89	ab	0.81	ab	0.87	a	**0,87**		0,04	4,60
3	**16**	P5.5	D31	0.88	a	0.89	a	0.91	a	**0,89**		0,02	2,25
4	**14**	P4.1	D31	0.88	b	0,91		0.99	b	**0,91**		0,06	6,59
5	**10**	P3.3	D82	0,93		0.89	b	0,93		**0,92**		0,02	2,17
6	**28**	P6	D60	0,92		0,94		0,93		**0,93**		0,01	1,08
7	**26**	P5.1	D35	0,96		0,94		0,93		**0,94**		0,02	2,13
8	**46**	P5.2	D31	0,93		0,93		0.98	b	**0,94**		0,03	3,19
9	**39**	P5.5	D31	0,95		0.93	b	0.98	b	**0,95**		0,03	3,16
10	**51**	P9.1	D42	0,94		0,96		0,96		**0,95**		0,01	1,05
11	**5**	P6.2	D52.1	0,96		0.85	b	1.06	b	**0,96**		0,11	11,46
12	**13**	P1	D17.1	0,97		0,95		0,96		**0,96**		0,01	1,04
13	**45**	P5.5	D31	0,98		0,98		0,98		**0,98**		0,00	0,00
14	**47**	P4.1	D32	0,99		0,99		0,97		**0,98**		0,01	1,02
15	**49**	P1	D10	0.89	b	0,98		0,99		**0,98**		0,06	6,12
16	**7**	P5.5	D31	1,01		1,00		1,00		**1,00**		0,01	1,00
17	**12**	P5.1	D31	1,00		0.96	b	1.09	b	**1,00**		0,07	7,00
18	**54**	P3.2	D31	1,00		0,99		1,01		**1,00**		0,01	1,00
19	**17**	P5.1	D32	1,01		1,01		1,01		**1,01**		0,00	0,00
20	**4a**	P9.1	D41	1,03		1,02		1,01		**1,02**		0,01	0,98
21	**41**	P4.1	D31	1,03		1,02		1,01		**1,02**		0,01	0,98
22	**42**	P4.1	D31	1,03		1,01		1,02		**1,02**		0,01	0,98
23	**44**	P4.1	D31	1,03		1,02		1,01		**1,02**		0,01	0,98
24	**6**	P3.2	D31	1,03		1,03		1,02		**1,03**		0,01	0,97
25	**25**	P1	D14.1	1,03		1,02		1,03		**1,03**		0,01	0,97
26	**48**	P4.1	D31	1,05		1,03		1,03		**1,04**		0,01	0,96
27	**55**	P5.5	D31	1,04		1,03		1,04		**1,04**		0,01	0,96
28	**8**	P3.2	D31	1,05		1,04		1.11	b	**1,05**		0,04	3,81
29	**20**	P1	D16.1	1,05		1,04		1,06		**1,05**		0,01	0,95
30	**43**	P4.1	D31	1,04		1.08	b	1,04		**1,05**		0,02	1,90
31	**50**	P4.1	D31	1,04		1,05		1,06		**1,05**		0,01	0,95
32	**4**	P5.1	D31	1.03	b	1,07		1.09	b	**1,07**		0,03	2,80
33	**9**	P5.5	D31	1,06		1,08		1,08		**1,07**		0,01	0,93
34	**11**	P5.1	D31	1,06		1,07		1,07		**1,07**		0,01	0,93
35	**29**	P3.3	D31	1,06		1.10	b	1,06		**1,07**		0,02	1,87
36	**24**	P3.3	D52.1	1,08		1.16	b	1.01	b	**1,08**		0,08	7,41
37	**18**	P5	D31	1,10		1.00	b	1,10		**1,09**		0,06	5,50
38	**38a**	P9.1	D42	1,09		1,09		1,09		**1,09**		0,00	0,00
39	**40**	P3.11	D31	1.11	b	1.07	b	1,09		**1,09**		0,02	1,83
40	**2**	P5.3	D31	1,10		1,10		1,10		**1,10**		0,00	0,00
41	**55a**	P9.1	D42	1,09		1,10		1,10		**1,10**		0,01	0,91
42	**3**	P1	D16.1	1,10		1,12		1,13		**1,12**		0,02	1,79
43	**1**	P1	D14.1	1.15	ab	1.21	a	1.25	ab	**1,21**		0,05	4,13
44	**23**	P3.3	D52	1.13	ab	1.29	ab	1.21	a	**1,21**		0,08	6,61
45	**37a**	P9.1	D42	1.22	a	1.24	a	1.25	a	**1,24**		0,02	1,61
46	**37**	P5.1	D31	1.27	a	1.30	a	1.28	a	**1,28**	*	0,02	1,56
47	**38**	P5.5	D31	1.38	a	1.43	ab	1.38	a	**1,39**	*	0,03	2,16
48	**19**	P1	D10	1.43	a	1.47	ab	1.38	ab	**1,43**	*	0,05	3,50
49	**15**	P1	D17.1	1.68	a	1.69	a	1.67	a	**1,68**	*	0,01	0,60
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,03		**0,02**	**2,40**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **10,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **S**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**5**	P6.2	D52.1	0.56	a	0.82	ab	0.54	a	**0,56**	*	0,16	28,57
2	**30**	P3.9	D52.1	0.84	a	0.82	a	0.82	a	**0,83**	*	0,01	1,20
3	**28**	P6	D60	1.13	ab	1.09	a	1.09	a	**1,10**		0,02	1,82
4	**36**	P6.5	D52.1	1.08	a	1.09	a	1.14	ab	**1,10**		0,03	2,73
5	**14**	P4.1	D31	1,17		1,20		1,21		**1,19**		0,02	1,68
6	**26**	P5.1	D35	1,20		1,20		1.10	b	**1,19**		0,06	5,04
7	**16**	P5.5	D31	1,20		1,20		1,20		**1,20**		0,00	0,00
8	**12**	P5.1	D31	1.28	b	1.18	b	1,23		**1,23**		0,05	4,07
9	**47**	P4.1	D32	1,23		1,26		1,24		**1,24**		0,02	1,61
10	**13**	P1	D17.1	1,26		1.32	b	1,25		**1,27**		0,04	3,15
11	**39**	P5.5	D31	1,26		1,25		1,29		**1,27**		0,02	1,57
12	**24**	P3.3	D52.1	1.23	b	1.32	b	1,28		**1,28**		0,05	3,91
13	**45**	P5.5	D31	1,28		1,28		1,28		**1,28**		0,00	0,00
14	**46**	P5.2	D31	1,27		1,28		1,29		**1,28**		0,01	0,78
15	**54**	P3.2	D31	1,30		1,31		1,27		**1,29**		0,02	1,55
16	**10**	P3.3	D82	1,30		1.27	b	1.36	b	**1,30**		0,05	3,85
17	**43**	P4.1	D31	1,28		1,31		1,30		**1,30**		0,02	1,54
18	**7**	P5.5	D31	1,32		1,30		1,30		**1,31**		0,01	0,76
19	**50**	P4.1	D31	1,30		1.34	b	1,29		**1,31**		0,03	2,29
20	**6**	P3.2	D31	1,31		1,32		1,32		**1,32**		0,01	0,76
21	**42**	P4.1	D31	1,32		1,31		1,32		**1,32**		0,01	0,76
22	**17**	P5.1	D32	1.29	b	1,33		1.39	b	**1,33**		0,05	3,76
23	**41**	P4.1	D31	1,32		1.37	b	1,32		**1,33**		0,03	2,26
24	**55**	P5.5	D31	1,31		1,35		1,33		**1,33**		0,02	1,50
25	**4**	P5.1	D31	1,34		1.27	b	1.38	b	**1,34**		0,06	4,48
26	**44**	P4.1	D31	1.37	b	1,34		1.30	b	**1,34**		0,04	2,99
27	**4a**	P9.1	D41	1,36		1,34		1,35		**1,35**		0,01	0,74
28	**9**	P5.5	D31	1,36		1,36		1.32	b	**1,35**		0,02	1,48
29	**48**	P4.1	D31	1,35		1,35		1,37		**1,36**		0,01	0,74
30	**8**	P3.2	D31	1,36		1,39		1,36		**1,37**		0,02	1,46
31	**51**	P9.1	D42	1,35		1,38		1,37		**1,37**		0,02	1,46
32	**40**	P3.11	D31	1.42	b	1,36		1,38		**1,38**		0,03	2,17
33	**2**	P5.3	D31	1.30	b	1,40		1,40		**1,39**		0,06	4,32
34	**20**	P1	D16.1	1,38		1,40		1,38		**1,39**		0,01	0,72
35	**29**	P3.3	D31	1.45	b	1,39		1,37		**1,39**		0,04	2,88
36	**11**	P5.1	D31	1,41		1,39		1,40		**1,40**		0,01	0,71
37	**18**	P5	D31	1,40		1,40		1,40		**1,40**		0,00	0,00
38	**25**	P1	D14.1	1,40		1,42		1,41		**1,41**		0,01	0,71
39	**49**	P1	D10	1,43		1,41		1.38	b	**1,41**		0,03	2,13
40	**55a**	P9.1	D42	1,41		1,41		1,42		**1,41**		0,01	0,71
41	**38a**	P9.1	D42	1,42		1,42		1,43		**1,42**		0,01	0,70
42	**3**	P1	D16.1	1,44		1,46		1,48		**1,46**		0,02	1,37
43	**37a**	P9.1	D42	1.60	a	1.62	a	1.65	ab	**1,62**	*	0,03	1,85
44	**23**	P3.3	D52	1.74	ab	1.63	a	1.59	ab	**1,63**	*	0,08	4,91
45	**37**	P5.1	D31	1.58	ab	1.65	a	1.63	a	**1,63**	*	0,04	2,45
46	**38**	P5.5	D31	1.68	a	1.66	a	1.61	ab	**1,66**	*	0,04	2,41
47	**1**	P1	D14.1	1.75	a	1.74	a	1.73	a	**1,74**	*	0,01	0,57
48	**19**	P1	D10	1.78	a	1.85	ab	1.74	ab	**1,78**	*	0,06	3,37
49	**15**	P1	D17.1	2.09	ab	2.12	a	2.23	ab	**2,12**	*	0,07	3,30
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,34		**0,03**	**2,53**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **18,4**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**46**	P5.2	D31	0.96	a	0.95	a	0.92	ab	**0,94**	*	0,02	2,13
2	**26**	P5.1	D35	0.99	a	1.10	ab	0.96	ab	**0,99**	*	0,07	7,07
3	**14**	P4.1	D31	0.99	ab	1.03	a	1.04	a	**1,02**	*	0,03	2,94
4	**18**	P3.31	D53.3	1.10	a	1.08	a	1.07	a	**1,08**	*	0,02	1,85
5	**10**	P5.1	D53.2	1.35	ab	1.09	a	0.97	ab	**1,09**	*	0,19	17,43
6	**1**	P3.21	D53.1	1.12	a	1.16	ab	1.12	a	**1,13**		0,02	1,77
7	**51**	P9.1	D42	1.13	a	1.15	a	1.13	a	**1,14**		0,01	0,88
8	**30**	P6.5	D53.1	1,17		1,17		1,15		**1,16**		0,01	0,86
9	**13**	P3.3	D53.1	1,21		1,22		1.16	b	**1,20**		0,03	2,50
10	**28**	P3.31	D53	1,21		1,20		1,19		**1,20**		0,01	0,83
11	**9**	P5.5	D31	1,21		1,20		1,22		**1,21**		0,01	0,83
12	**16**	P5.5	D31	1,23		1.17	b	1,25		**1,23**		0,04	3,25
13	**49**	P4.1	D31	1,22		1,23		1,23		**1,23**		0,01	0,81
14	**6**	P3.2	D31	1,26		1,24		1,24		**1,25**		0,01	0,80
15	**40**	P3.11	D31	1,24		1,25		1,26		**1,25**		0,01	0,80
16	**50**	P4.1	D31	1,24		1,25		1,26		**1,25**		0,01	0,80
17	**8**	P3.2	D31	1,26		1,27		1,26		**1,26**		0,01	0,79
18	**39**	P5.5	D31	1,26		1,27		1,24		**1,26**		0,02	1,59
19	**5**	P6.2	D53.1	1.33	b	1,26		1,25		**1,27**		0,04	3,15
20	**43**	P4.1	D31	1,29		1,25		1,27		**1,27**		0,02	1,57
21	**47**	P4.1	D32	1,26		1,29		1,26		**1,27**		0,02	1,57
22	**54**	P3.2	D31	1,26		1,29		1,27		**1,27**		0,02	1,57
23	**3**	P3.10	D31	1,27		1,30		1,27		**1,28**		0,02	1,56
24	**12**	P5.1	D31	1,27		1,26		1.31	b	**1,28**		0,03	2,34
25	**20**	P5.1	D31	1,30		1,30		1,28		**1,29**		0,01	0,78
26	**41**	P4.1	D31	1,28		1,30		1,29		**1,29**		0,01	0,78
27	**4a**	P9.1	D41	1,31		1,30		1,29		**1,30**		0,01	0,77
28	**17**	P5.1	D32	1,30		1,29		1,31		**1,30**		0,01	0,77
29	**35**	P3.21	D52.3	1,30		1,30		1,31		**1,30**		0,01	0,77
30	**44**	P4.1	D31	1,28		1,31		1,30		**1,30**		0,02	1,54
31	**48**	P4.1	D31	1,31		1,30		1,30		**1,30**		0,01	0,77
32	**55**	P5.5	D31	1,31		1,30		1,29		**1,30**		0,01	0,77
33	**19**	P5.5	D31	1.27	b	1.38	b	1,32		**1,32**		0,06	4,55
34	**38a**	P9.1	D42	1,32		1,33		1,32		**1,32**		0,01	0,76
35	**52**	P4.1	D31	1,32		1,32		1,32		**1,32**		0,00	0,00
36	**25**	P5.1	D31	1,32		1,34		1,32		**1,33**		0,01	0,75
37	**37a**	P9.1	D42	1,32		1,34		1,34		**1,33**		0,01	0,75
38	**38**	P5.5	D31	1,35		1,31		1,33		**1,33**		0,02	1,50
39	**42**	P4.1	D31	1,35		1,32		1,33		**1,33**		0,02	1,50
40	**55a**	P9.1	D42	1,32		1,34		1,33		**1,33**		0,01	0,75
41	**11**	P5.1	D31	1,35		1,34		1,34		**1,34**		0,01	0,75
42	**4**	P5.1	D31	1,35		1.38	b	1.28	b	**1,35**		0,05	3,70
43	**7**	P5.5	D31	1,34		1,35		1,36		**1,35**		0,01	0,74
44	**24**	P6.4	D53.2	1,34		1.40	b	1,34		**1,35**		0,03	2,22
45	**23**	P3.3	D31	1,38		1,38		1,39		**1,38**		0,01	0,72
46	**37**	P5.1	D31	1,37		1.40	b	1,36		**1,38**		0,02	1,45
47	**2**	P5.3	D31	1,40		1,40		1,40		**1,40**		0,00	0,00
48	**45**	P5.5	D31	1.41	a	1.40	a	1.41	a	**1,41**		0,01	0,71
49	**36**	P3.3	D53.1	1.50	a	1.45	ab	1.49	a	**1,48**	*	0,03	2,03
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,28		**0,02**	**1,83**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **12,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **P**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**26**	P5.1	D35	1.00	a	0.99	a	1.00	a	**1,00**	*	0,01	1,00
2	**46**	P5.2	D31	1.04	ab	1.00	a	1.00	a	**1,01**	*	0,02	1,98
3	**18**	P3.31	D53.3	1.12	a	1.14	a	1.13	a	**1,13**	*	0,01	0,88
4	**13**	P3.3	D53.1	1.26	a	1.23	ab	1.32	ab	**1,26**		0,05	3,97
5	**30**	P6.5	D53.1	1,29		1,30		1,28		**1,29**		0,01	0,78
6	**14**	P4.1	D31	1,29		1,31		1,31		**1,30**		0,01	0,77
7	**28**	P3.31	D53	1,31		1,31		1,31		**1,31**		0,00	0,00
8	**1**	P3.21	D53.1	1.34	b	1,31		1,31		**1,32**		0,02	1,52
9	**36**	P3.3	D53.1	1,32		1,31		1.34	b	**1,32**		0,02	1,52
10	**9**	P5.5	D31	1.36	b	1,32		1,32		**1,33**		0,02	1,50
11	**47**	P4.1	D32	1,33		1,33		1,32		**1,33**		0,01	0,75
12	**8**	P3.2	D31	1,35		1,36		1,34		**1,35**		0,01	0,74
13	**24**	P6.4	D53.2	1,36		1.33	b	1,35		**1,35**		0,02	1,48
14	**43**	P4.1	D31	1,35		1,35		1,36		**1,35**		0,01	0,74
15	**49**	P4.1	D31	1.39	b	1.31	b	1,35		**1,35**		0,04	2,96
16	**6**	P3.2	D31	1,36		1,35		1.38	b	**1,36**		0,02	1,47
17	**39**	P5.5	D31	1,37		1.34	b	1,37		**1,36**		0,02	1,47
18	**19**	P5.5	D31	1,37		1.41	b	1.31	b	**1,37**		0,05	3,65
19	**50**	P4.1	D31	1.35	b	1,37		1,38		**1,37**		0,02	1,46
20	**17**	P5.1	D32	1,38		1,38		1,38		**1,38**		0,00	0,00
21	**20**	P5.1	D31	1.42	b	1,38		1,37		**1,38**		0,03	2,17
22	**45**	P5.5	D31	1,37		1,37		1.40	b	**1,38**		0,02	1,45
23	**54**	P3.2	D31	1,38		1,38		1,37		**1,38**		0,01	0,72
24	**3**	P3.10	D31	1,39		1.42	b	1.37	b	**1,39**		0,03	2,16
25	**5**	P6.2	D53.1	1,39		1,38		1.52	b	**1,39**		0,08	5,76
26	**10**	P5.1	D53.2	1,38		1,38		1.65	b	**1,39**		0,16	11,51
27	**25**	P5.1	D31	1,38		1,40		1,39		**1,39**		0,01	0,72
28	**41**	P4.1	D31	1,38		1,40		1,40		**1,39**		0,01	0,72
29	**55**	P5.5	D31	1,40		1,39		1.37	b	**1,39**		0,02	1,44
30	**11**	P5.1	D31	1,40		1,41		1,40		**1,40**		0,01	0,71
31	**16**	P5.5	D31	1,41		1,41		1.37	b	**1,40**		0,02	1,43
32	**40**	P3.11	D31	1,40		1,41		1,39		**1,40**		0,01	0,71
33	**44**	P4.1	D31	1,40		1,41		1,39		**1,40**		0,01	0,71
34	**48**	P4.1	D31	1,41		1,42		1,40		**1,41**		0,01	0,71
35	**51**	P9.1	D42	1.40	b	1,42		1,43		**1,42**		0,02	1,41
36	**52**	P4.1	D31	1,44		1,43		1,42		**1,43**		0,01	0,70
37	**12**	P5.1	D31	1.35	b	1.46	b	1,44		**1,44**		0,06	4,17
38	**35**	P3.21	D52.3	1,43		1,44		1,44		**1,44**		0,01	0,69
39	**42**	P4.1	D31	1,43		1,45		1,45		**1,44**		0,01	0,69
40	**7**	P5.5	D31	1,46		1.44	b	1,47		**1,46**		0,02	1,37
41	**38**	P5.5	D31	1.51	b	1,45		1,45		**1,46**		0,03	2,05
42	**37**	P5.1	D31	1,47		1.51	b	1,48		**1,48**		0,02	1,35
43	**4a**	P9.1	D41	1,52		1,52		1.49	b	**1,51**		0,02	1,32
44	**4**	P5.1	D31	1.50	ab	1.52	a	1.55	ab	**1,52**		0,03	1,97
45	**23**	P3.3	D31	1.53	a	1.52	a	1.45	ab	**1,52**		0,04	2,63
46	**37a**	P9.1	D42	1.55	a	1.58	ab	1.56	a	**1,56**		0,02	1,28
47	**38a**	P9.1	D42	1.56	a	1.56	a	1.55	a	**1,56**		0,01	0,64
48	**2**	P5.3	D31	1.60	a	1.60	a	1.60	a	**1,60**		0,00	0,00
49	**55a**	P9.1	D42	1.65	a	1.66	a	1.64	a	**1,65**	*	0,01	0,61
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,39		**0,02**	**1,64**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,2**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **1,39**

ICP-Forests 5th needle/leaf labtest 01/02

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	**26**	P5.1	D35	1.00	a	1.10	ab	1.00	a	**1,00**	*	0,06	6,00
2	**46**	P5.2	D31	0.99	ab	1.01	a	1.01	a	**1,01**	*	0,01	0,99
3	**18**	P3.31	D53.3	1.13	ab	1.16	a	1.16	a	**1,16**	*	0,02	1,72
4	**30**	P6.5	D53.1	1.20	ab	1.23	ab	1.21	a	**1,21**		0,02	1,65
5	**14**	P4.1	D31	1.21	ab	1.22	a	1.26	ab	**1,22**		0,03	2,46
6	**51**	P9.1	D42	1.24	a	1.24	a	1.25	ab	**1,24**		0,01	0,81
7	**13**	P3.3	D53.1	1,28		1.25	b	1.30	b	**1,28**		0,03	2,34
8	**49**	P4.1	D31	1.23	b	1,28		1.35	b	**1,28**		0,06	4,69
9	**28**	P3.31	D53	1.32	b	1,31		1.29	b	**1,31**		0,02	1,53
10	**16**	P5.5	D31	1.31	b	1,32		1.34	b	**1,32**		0,02	1,52
11	**10**	P5.1	D53.2	1.24	b	1,33		1.56	b	**1,33**		0,17	12,78
12	**1**	P3.21	D53.1	1,34		1.38	b	1,34		**1,34**		0,02	1,49
13	**8**	P3.2	D31	1.30	b	1,34		1.40	b	**1,34**		0,05	3,73
14	**9**	P5.5	D31	1,35		1,35		1.34	b	**1,35**		0,01	0,74
15	**43**	P4.1	D31	1,35		1.31	b	1,35		**1,35**		0,02	1,48
16	**3**	P3.10	D31	1.35	b	1.42	b	1,36		**1,36**		0,04	2,94
17	**47**	P4.1	D32	1,36		1,36		1.35	b	**1,36**		0,01	0,74
18	**19**	P5.5	D31	1,37		1.45	b	1.35	b	**1,37**		0,05	3,65
19	**54**	P3.2	D31	1.38	b	1.36	b	1,37		**1,37**		0,01	0,73
20	**20**	P5.1	D31	1.40	b	1.37	b	1,38		**1,38**		0,02	1,45
21	**24**	P6.4	D53.2	1.39	b	1,38		1.37	b	**1,38**		0,01	0,72
22	**48**	P4.1	D31	1.40	b	1.37	b	1,38		**1,38**		0,02	1,45
23	**5**	P6.2	D53.1	1,39		1.42	b	1,39		**1,39**		0,02	1,44
24	**6**	P3.2	D31	1,39		1,39		1.38	b	**1,39**		0,01	0,72
25	**39**	P5.5	D31	1.45	b	1.38	b	1,39		**1,39**		0,04	2,88
26	**40**	P3.11	D31	1.41	b	1.38	b	1,39		**1,39**		0,02	1,44
27	**41**	P4.1	D31	1.38	b	1,39		1,39		**1,39**		0,01	0,72
28	**45**	P5.5	D31	1.38	b	1,39		1.41	b	**1,39**		0,02	1,44
29	**50**	P4.1	D31	1.35	b	1,39		1.40	b	**1,39**		0,03	2,16
30	**17**	P5.1	D32	1.41	b	1,40		1,40		**1,40**		0,01	0,71
31	**55**	P5.5	D31	1.41	b	1,40		1.38	b	**1,40**		0,02	1,43
32	**11**	P5.1	D31	1,41		1.42	b	1,41		**1,41**		0,01	0,71
33	**35**	P3.21	D52.3	1,41		1,41		1.40	b	**1,41**		0,01	0,71
34	**36**	P3.3	D53.1	1,41		1,41		1.43	b	**1,41**		0,01	0,71
35	**7**	P5.5	D31	1.43	b	1.41	b	1,42		**1,42**		0,01	0,70
36	**12**	P5.1	D31	1.41	b	1,42		1.52	b	**1,42**		0,06	4,23
37	**44**	P4.1	D31	1,42		1,42		1.38	b	**1,42**		0,02	1,41
38	**52**	P4.1	D31	1,43		1.44	b	1.42	b	**1,43**		0,01	0,70
39	**25**	P5.1	D31	1,44		1.45	b	1,44		**1,44**		0,01	0,69
40	**42**	P4.1	D31	1.45	b	1,44		1,44		**1,44**		0,01	0,69
41	**4a**	P9.1	D41	1.49	b	1,45		1,45		**1,45**		0,02	1,38
42	**38**	P5.5	D31	1.44	b	1,47		1.54	b	**1,47**		0,05	3,40
43	**4**	P5.1	D31	1.50	b	1,51		1,51		**1,51**		0,01	0,66
44	**23**	P3.3	D31	1.51	b	1.54	b	1,52		**1,52**		0,02	1,32
45	**38a**	P9.1	D42	1.51	b	1,52		1,52		**1,52**		0,01	0,66
46	**37a**	P9.1	D42	1.53	a	1.52	ab	1.53	a	**1,53**		0,01	0,65
47	**55a**	P9.1	D42	1.53	a	1.53	a	1.53	a	**1,53**		0,00	0,00
48	**37**	P5.1	D31	1.58	a	1.56	ab	1.64	ab	**1,58**		0,04	2,53
49	**2**	P5.3	D31	1.60	a	1.60	a	1.60	a	**1,60**	*	0,00	0,00
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,39		**0,02**	**1,83**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **P**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**46**	P5.2	D31	1.18	ab	1.22	a	1.25	ab	**1,22**	*	0,04	3,28
2	**26**	P5.1	D35	1.30	a	1.20	ab	1.30	a	**1,29**	*	0,06	4,65
3	**18**	P3.31	D53.3	1.36	a	1.38	a	1.41	ab	**1,38**		0,03	2,17
4	**14**	P4.1	D31	1.43	a	1.45	a	1.45	a	**1,44**		0,01	0,69
5	**43**	P4.1	D31	1.45	a	1.48	a	1.47	a	**1,47**		0,02	1,36
6	**30**	P6.5	D53.1	1,50		1,50		1,48		**1,49**		0,01	0,67
7	**28**	P3.31	D53	1.49	b	1,54		1,53		**1,53**		0,03	1,96
8	**13**	P3.3	D53.1	1.48	b	1,56		1,54		**1,54**		0,04	2,60
9	**10**	P5.1	D53.2	1.35	b	1,56		1,56		**1,55**		0,12	7,74
10	**9**	P5.5	D31	1,55		1,57		1,58		**1,57**		0,02	1,27
11	**16**	P5.5	D31	1.54	b	1,57		1,58		**1,57**		0,02	1,27
12	**39**	P5.5	D31	1,56		1,57		1,59		**1,57**		0,02	1,27
13	**8**	P3.2	D31	1,57		1,58		1,58		**1,58**		0,01	0,63
14	**47**	P4.1	D32	1,58		1,57		1,59		**1,58**		0,01	0,63
15	**51**	P9.1	D42	1,57		1,58		1,58		**1,58**		0,01	0,63
16	**1**	P3.21	D53.1	1,59		1,59		1,59		**1,59**		0,00	0,00
17	**6**	P3.2	D31	1,58		1,60		1,60		**1,59**		0,01	0,63
18	**12**	P5.1	D31	1,57		1.62	b	1,59		**1,59**		0,03	1,89
19	**19**	P5.5	D31	1,59		1.67	b	1.55	b	**1,59**		0,06	3,77
20	**36**	P3.3	D53.1	1.62	b	1,58		1,58		**1,59**		0,02	1,26
21	**50**	P4.1	D31	1.52	b	1,59		1,60		**1,59**		0,04	2,52
22	**54**	P3.2	D31	1,58		1,60		1,60		**1,59**		0,01	0,63
23	**3**	P3.10	D31	1,58		1.63	b	1,60		**1,60**		0,03	1,88
24	**20**	P5.1	D31	1,61		1,63		1,60		**1,61**		0,02	1,24
25	**41**	P4.1	D31	1,60		1,63		1,61		**1,61**		0,02	1,24
26	**45**	P5.5	D31	1,61		1,61		1,62		**1,61**		0,01	0,62
27	**55**	P5.5	D31	1,62		1,61		1,60		**1,61**		0,01	0,62
28	**17**	P5.1	D32	1,60		1,62		1,63		**1,62**		0,02	1,23
29	**40**	P3.11	D31	1,61		1,64		1,62		**1,62**		0,02	1,23
30	**44**	P4.1	D31	1.67	b	1,62		1,61		**1,62**		0,03	1,85
31	**24**	P6.4	D53.2	1.66	b	1,61		1,63		**1,63**		0,03	1,84
32	**35**	P3.21	D52.3	1,63		1,63		1,64		**1,63**		0,01	0,61
33	**11**	P5.1	D31	1,64		1,65		1,65		**1,65**		0,01	0,61
34	**25**	P5.1	D31	1,64		1,66		1,64		**1,65**		0,01	0,61
35	**48**	P4.1	D31	1,64		1,64		1.67	b	**1,65**		0,02	1,21
36	**42**	P4.1	D31	1,67		1,67		1,65		**1,66**		0,01	0,60
37	**7**	P5.5	D31	1,69		1,68		1,66		**1,68**		0,02	1,19
38	**52**	P4.1	D31	1,68		1,68		1,67		**1,68**		0,01	0,60
39	**37**	P5.1	D31	1,70		1.74	b	1,69		**1,70**		0,03	1,76
40	**2**	P5.3	D31	1.80	b	1,70		1,70		**1,71**		0,06	3,51
41	**38**	P5.5	D31	1,72		1,71		1,69		**1,71**		0,02	1,17
42	**4**	P5.1	D31	1,74		1,73		1,74		**1,74**		0,01	0,57
43	**4a**	P9.1	D41	1,75		1.72	b	1,75		**1,74**		0,02	1,15
44	**5**	P6.2	D53.1	1.65	b	1,76		1.80	b	**1,76**		0,08	4,55
45	**49**	P4.1	D31	1.78	a	1.75	ab	1.78	a	**1,77**		0,02	1,13
46	**37a**	P9.1	D42	1.80	a	1.78	a	1.77	a	**1,78**		0,02	1,12
47	**38a**	P9.1	D42	1.78	a	1.78	a	1.78	a	**1,78**		0,00	0,00
48	**29**	P3.3	D31	1.91	ab	1.79	ab	1.84	a	**1,84**		0,06	3,26
49	**23**	P3.3	D31	1.86	a	1.85	a	1.80	ab	**1,85**		0,03	1,62
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,62		**0,03**	**1,60**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **4,1**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**10**	P5.1	D21.1	8.26	a	8.12	ab	8.40	ab	**8,26**	*	0,14	1,69
2	**46**	P5.2	D31	9.48	ab	9.22	a	8.91	ab	**9,22**	*	0,29	3,15
3	**1**	P3.21	D21.1	9.15	ab	9.31	a	9.27	a	**9,27**	*	0,08	0,86
4	**18**	P3.31	D31	11.01	ab	9.83	a	9.82	a	**9,85**		0,68	6,90
5	**51**	P9.1	D42	10.10	a	10.20	a	10.20	a	**10,18**		0,06	0,59
6	**36**	P3.3	D21	10.26	a	10.27	a	10.36	a	**10,29**		0,06	0,58
7	**13**	P3.3	D21.1	10.36	a	10.15	ab	10.30	a	**10,30**		0,11	1,07
8	**14**	P4.1	D31	9.97	b	10,55		10.71	b	**10,55**		0,39	3,70
9	**23**	P3.3	D31	10,72		10,66		10,77		**10,72**		0,06	0,56
10	**27**	P6.1	D21	10,78		10,78		10,67		**10,76**		0,06	0,56
11	**9**	P5.5	D31	11.29	b	10,77		10.31	b	**10,77**		0,49	4,55
12	**17**	P5.1	D31	10,85		10,89		10,83		**10,86**		0,03	0,28
13	**33**	P5.1	D21	10.70	b	10,90		10,88		**10,87**		0,11	1,01
14	**25**	P5.1	D31	10,89		11.09	b	10,95		**10,95**		0,10	0,91
15	**52**	P4.1	D31	10,95		10,96		10,93		**10,95**		0,02	0,18
16	**49**	P4.1	D31	11,07		10,95		11,07		**11,05**		0,07	0,63
17	**54**	P3.2	D31	11,08		11,13		11,06		**11,09**		0,04	0,36
18	**45**	P5.5	D31	11,13		11,08		11,12		**11,11**		0,03	0,27
19	**12**	P5.1	D31	11.28	b	11,14		11,15		**11,17**		0,08	0,72
20	**37**	P5.1	D31	11,12		11,20		11,18		**11,17**		0,04	0,36
21	**43**	P4.1	D31	11,21		11,17		11,11		**11,17**		0,05	0,45
22	**16**	P5.5	D31	11,20		10.70	b	11,20		**11,18**		0,29	2,59
23	**44**	P4.1	D31	11,19		11,17		11,26		**11,20**		0,05	0,45
24	**8**	P3.2	D31	11,20		11,30		11,20		**11,22**		0,06	0,53
25	**6**	P3.2	D31	11,34		11,24		11,26		**11,27**		0,05	0,44
26	**38**	P5.5	D31	11.66	b	11.18	b	11,28		**11,28**		0,25	2,22
27	**3**	P3.10	D31	11,29		11.45	b	11,20		**11,29**		0,13	1,15
28	**41**	P4.1	D31	11,33		11,37		11,31		**11,34**		0,03	0,26
29	**55**	P5.5	D31	11.49	b	11,39		11.12	b	**11,39**		0,19	1,67
30	**2**	P5.3	D31	11,40		11,40		11,40		**11,40**		0,00	0,00
31	**24**	P5.1	D21	11,52		11,39		11,42		**11,43**		0,07	0,61
32	**55a**	P9.1	D42	11,42		11,43		11,45		**11,43**		0,02	0,17
33	**42**	P4.1	D31	11,50		11,38		11,44		**11,44**		0,06	0,52
34	**47**	P4.1	D32	11.15	b	11,45		11.59	b	**11,45**		0,22	1,92
35	**37a**	P9.1	D42	11,50		11,45		11,48		**11,48**		0,03	0,26
36	**39**	P5.5	D31	11,48		11.63	b	11.35	b	**11,48**		0,14	1,22
37	**29**	P3.3	D31	11,47		11.66	b	11,47		**11,49**		0,11	0,96
38	**4a**	P9.1	D41	11.30	b	11,63		11,56		**11,56**		0,17	1,47
39	**20**	P5.1	D31	11,51		11,61		11,59		**11,58**		0,05	0,43
40	**28**	P3.31	D21	11.77	b	11,62		11.51	b	**11,62**		0,13	1,12
41	**40**	P3.11	D31	11.82	b	10.98	b	11,67		**11,67**		0,45	3,86
42	**4**	P5.1	D31	11.88	b	11,72		11.30	b	**11,72**		0,30	2,56
43	**50**	P4.1	D31	11,68		11,77		11.98	b	**11,77**		0,15	1,27
44	**7**	P5.5	D31	11,80		11.60	b	11,80		**11,78**		0,12	1,02
45	**48**	P4.1	D31	11,80		11,82		11,77		**11,80**		0,03	0,25
46	**11**	P5.1	D31	11,84		11,91		11,89		**11,88**		0,04	0,34
47	**38a**	P9.1	D42	12,00		11,90		11,90		**11,92**		0,06	0,50
48	**19**	P5.5	D31	12,00		11,88		11,98		**11,97**		0,06	0,50
49	**5**	P3.3	D21	12.30	ab	12.05	a	12.10	a	**12,10**		0,13	1,07
										Mean		Interlab.std. deviation	
												abs.	rel.%
										11,25		**0,13**	**1,20**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,1**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Ca**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**5**	P3.3	D21	2.15	ab	1.78	a	1.75	a	**1,78**	*	0,22	12,36
2	**46**	P5.2	D31	1.81	a	1.75	ab	1.83	a	**1,81**	*	0,04	2,21
3	**27**	P6.1	D21	1.90	a	1.93	a	1.93	a	**1,92**	*	0,02	1,04
4	**1**	P3.21	D21.1	2.28	ab	1.99	ab	2.03	a	**2,03**		0,16	7,88
5	**13**	P3.3	D21.1	2.04	a	2.04	a	2.24	ab	**2,05**		0,12	5,85
6	**18**	P3.31	D31	2.08	a	2.01	ab	2.07	a	**2,06**		0,04	1,94
7	**51**	P9.1	D42	2,14		2,17		2,18		**2,16**		0,02	0,93
8	**9**	P5.5	D31	2,20		2,19		2.08	b	**2,18**		0,07	3,21
9	**23**	P3.3	D31	2,22		2,25		2.16	b	**2,22**		0,05	2,25
10	**7**	P5.5	D31	2,24		2,22		2.28	b	**2,24**		0,03	1,34
11	**40**	P3.11	D31	2.21	b	2.35	b	2,27		**2,27**		0,07	3,08
12	**6**	P3.2	D31	2,27		2,30		2,27		**2,28**		0,02	0,88
13	**52**	P4.1	D31	2,30		2,28		2,29		**2,29**		0,01	0,44
14	**14**	P4.1	D31	2.22	b	2,30		2.42	b	**2,30**		0,10	4,35
15	**43**	P4.1	D31	2,32		2.36	b	2,30		**2,32**		0,03	1,29
16	**44**	P4.1	D31	2,31		2,33		2,32		**2,32**		0,01	0,43
17	**45**	P5.5	D31	2,32		2,32		2,32		**2,32**		0,00	0,00
18	**49**	P4.1	D31	2,34		2,32		2.22	b	**2,32**		0,06	2,59
19	**17**	P5.1	D31	2.29	b	2,35		2,34		**2,33**		0,03	1,29
20	**47**	P4.1	D32	2,35		2,32		2,32		**2,33**		0,02	0,86
21	**36**	P3.3	D21	2,36		2.27	b	2,36		**2,35**		0,05	2,13
22	**55**	P5.5	D31	2,37		2,36		2,35		**2,36**		0,01	0,42
23	**4a**	P9.1	D41	2,37		2.32	b	2.41	b	**2,37**		0,05	2,11
24	**8**	P3.2	D31	2,38		2,37		2,36		**2,37**		0,01	0,42
25	**12**	P5.1	D31	2,39		2,37		2.24	b	**2,37**		0,08	3,38
26	**42**	P4.1	D31	2,37		2,39		2,38		**2,38**		0,01	0,42
27	**2**	P5.3	D31	2,40		2,40		2.30	b	**2,39**		0,06	2,51
28	**16**	P5.5	D31	2.47	b	2,39		2.28	b	**2,39**		0,10	4,18
29	**41**	P4.1	D31	2,40		2,38		2,39		**2,39**		0,01	0,42
30	**54**	P3.2	D31	2,37		2,40		2,39		**2,39**		0,02	0,84
31	**29**	P3.3	D31	2,38		2.44	b	2,39		**2,40**		0,03	1,25
32	**38**	P5.5	D31	2.58	b	2,38		2,39		**2,40**		0,11	4,58
33	**3**	P3.10	D31	2,42		2,43		2,38		**2,41**		0,03	1,24
34	**20**	P5.1	D31	2,43		2,38		2,41		**2,41**		0,03	1,24
35	**33**	P5.1	D21	2,42		2.50	b	2.35	b	**2,42**		0,08	3,31
36	**11**	P5.1	D31	2,44		2,43		2,44		**2,44**		0,01	0,41
37	**4**	P5.1	D31	2.55	b	2,44		2,45		**2,46**		0,06	2,44
38	**39**	P5.5	D31	2.52	b	2.41	b	2,48		**2,48**		0,06	2,42
39	**24**	P5.1	D21	2,49		2.61	b	2,46		**2,49**		0,08	3,21
40	**26**	P5.1	D31	2.48	b	2.56	b	2,52		**2,52**		0,04	1,59
41	**48**	P4.1	D31	2,50		2,52		2.56	b	**2,52**		0,03	1,19
42	**37a**	P9.1	D42	2,54		2,54		2,53		**2,54**		0,01	0,39
43	**38a**	P9.1	D42	2,53		2,55		2,55		**2,54**		0,01	0,39
44	**28**	P3.31	D21	2.53	b	2,60		2.65	b	**2,60**		0,06	2,31
45	**50**	P4.1	D31	2,59		2,60		2,62		**2,60**		0,02	0,77
46	**55a**	P9.1	D42	2,60		2,62		2,61		**2,61**		0,01	0,38
47	**37**	P5.1	D31	2.60	b	2,66		2,64		**2,64**		0,03	1,14
48	**25**	P5.1	D31	2.67	a	2.67	a	2.70	a	**2,68**		0,02	0,75
49	**19**	P5.5	D31	3.17	a	3.28	ab	3.19	a	**3,19**	*	0,06	1,88
										Mean		Interlab.std. deviation	
												abs.	rel.%
										2,38		**0,05**	**2,08**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,2**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **2,46**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**27**	P6.1	D21	3.56	ab	2.68	ab	2.78	a	**2,78 ***	0,48	17,27
2	**46**	P5.2	D31	2.82	a	2.85	a	2.98	ab	**2,85 ***	0,09	3,16
3	**5**	P3.3	D21	3.05	ab	3.25	a	3.58	ab	**3,25 ***	0,27	8,31
4	**13**	P3.3	D21.1	3.37	a	3.66	ab	3.40	a	**3,40**	0,16	4,71
5	**9**	P5.5	D31	3,56		3,56		3,52		**3,55**	0,02	0,56
6	**14**	P4.1	D31	3.39	b	3,57		3,58		**3,56**	0,11	3,09
7	**1**	P3.21	D21.1	3,65		3.74	b	3.57	b	**3,65**	0,09	2,47
8	**51**	P9.1	D42	3,61		3,65		3,68		**3,65**	0,04	1,10
9	**7**	P5.5	D31	3,69		3,65		3,65		**3,66**	0,02	0,55
10	**36**	P3.3	D21	3,66		3,68		3,70		**3,68**	0,02	0,54
11	**49**	P4.1	D31	3.52	b	3,70		4.05	b	**3,70**	0,27	7,30
12	**52**	P4.1	D31	3,74		3,70		3,71		**3,72**	0,02	0,54
13	**16**	P5.5	D31	3,73		3,69		3,78		**3,73**	0,05	1,34
14	**45**	P5.5	D31	3,75		3,77		3,75		**3,76**	0,01	0,27
15	**23**	P3.3	D31	3.92	b	3.65	b	3,77		**3,77**	0,14	3,71
16	**43**	P4.1	D31	3,76		3.93	b	3,75		**3,77**	0,10	2,65
17	**18**	P3.31	D31	3,81		3,80		3.45	b	**3,79**	0,21	5,54
18	**44**	P4.1	D31	3,80		3,80		3,74		**3,79**	0,03	0,79
19	**4a**	P9.1	D41	3.73	b	3,80		3.88	b	**3,80**	0,08	2,11
20	**37**	P5.1	D31	3,81		3,86		1.84	b	**3,81**	1,15	30,18
21	**40**	P3.11	D31	3,86		3.72	b	3,81		**3,81**	0,07	1,84
22	**29**	P3.3	D31	3,81		3,80		3.90	b	**3,82**	0,06	1,57
23	**47**	P4.1	D32	3,82		3,82		3,83		**3,82**	0,01	0,26
24	**8**	P3.2	D31	3.70	b	3,83		3.98	b	**3,83**	0,14	3,66
25	**17**	P5.1	D31	3,83		3,87		3,81		**3,83**	0,03	0,78
26	**54**	P3.2	D31	3,85		3,85		3,81		**3,84**	0,02	0,52
27	**6**	P3.2	D31	3,88		3,84		3,85		**3,86**	0,02	0,52
28	**41**	P4.1	D31	3,84		3,87		3,86		**3,86**	0,02	0,52
29	**20**	P5.1	D31	3,87		3,85		3.95	b	**3,87**	0,05	1,29
30	**55**	P5.5	D31	3,90		3,87		3,82		**3,87**	0,04	1,03
31	**38**	P5.5	D31	3.84	b	3,90		4.08	b	**3,90**	0,12	3,08
32	**42**	P4.1	D31	3,93		3,89		3,91		**3,91**	0,02	0,51
33	**24**	P5.1	D21	3,89		4.01	b	3,92		**3,92**	0,06	1,53
34	**12**	P5.1	D31	3,93		3,91		4.04	b	**3,93**	0,07	1,78
35	**3**	P3.10	D31	3.82	b	3,96		3,97		**3,95**	0,08	2,03
36	**33**	P5.1	D21	3,96		4.02	b	3.89	b	**3,96**	0,07	1,77
37	**2**	P5.3	D31	4,00		4,00		3.90	b	**3,99**	0,06	1,50
38	**48**	P4.1	D31	3,99		3,98		3,99		**3,99**	0,01	0,25
39	**11**	P5.1	D31	3.96	b	4,03		4,03		**4,02**	0,04	1,00
40	**25**	P5.1	D31	4,04		4,03		4,04		**4,04**	0,01	0,25
41	**4**	P5.1	D31	4,06		4,10		3.89	b	**4,06**	0,11	2,71
42	**37a**	P9.1	D42	4,10		4,03		4,06		**4,06**	0,04	0,99
43	**28**	P3.31	D21	4,16		4,13		4.06	b	**4,13**	0,05	1,21
44	**39**	P5.5	D31	4.46	b	4,16		4,16		**4,17**	0,17	4,08
45	**26**	P5.1	D31	4,18		4,14		4,23		**4,18**	0,05	1,20
46	**55a**	P9.1	D42	4,18		4,20		4,19		**4,19**	0,01	0,24
47	**38a**	P9.1	D42	4,21		4,21		4,20		**4,21**	0,01	0,24
48	**50**	P4.1	D31	4.17	ab	4.24	a	4.24	a	**4,23**	0,04	0,95
49	**10**	P5.1	D21.1	4.34	a	4.38	a	4.78	ab	**4,38**	0,24	5,48
										Mean	Interlab.std. deviation	
											abs.	rel.%
										3,87	**0,10**	**2,84**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,1**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Ca**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**5**	P3.3	D21	1.59	a	1.55	a	1.59	a	**1,58 ***	0,02	1,27
2	**27**	P6.1	D21	1.98	ab	1.74	ab	1.79	a	**1,79 ***	0,13	7,26
3	**46**	P5.2	D31	2.01	a	1.94	ab	2.00	a	**1,99 ***	0,04	2,01
4	**13**	P3.3	D21.1	2.09	a	2.06	a	2.36	ab	**2,09 ***	0,17	8,13
5	**18**	P3.31	D31	2.16	a	2.20	a	2.20	a	**2,19 ***	0,02	0,91
6	**1**	P3.21	D21.1	2,31		2,31		2,27		**2,30**	0,02	0,87
7	**9**	P5.5	D31	2,32		2,29		2,34		**2,32**	0,03	1,29
8	**14**	P4.1	D31	2,37		2,38		2.45	b	**2,39**	0,04	1,67
9	**7**	P5.5	D31	2,43		2,46		2,43		**2,44**	0,02	0,82
10	**23**	P3.3	D31	2,46		2,47		2.39	b	**2,45**	0,04	1,63
11	**26**	P5.1	D31	2.42	b	2.51	b	2,47		**2,47**	0,05	2,02
12	**6**	P3.2	D31	2,47		2,50		2,47		**2,48**	0,02	0,81
13	**40**	P3.11	D31	2.52	b	2,48		2.44	b	**2,48**	0,04	1,61
14	**43**	P4.1	D31	2.41	b	2,51		2,48		**2,48**	0,05	2,02
15	**51**	P9.1	D42	2,47		2,49		2,50		**2,49**	0,02	0,80
16	**52**	P4.1	D31	2,50		2,51		2,49		**2,50**	0,01	0,40
17	**44**	P4.1	D31	2,54		2,53		2.47	b	**2,52**	0,04	1,59
18	**12**	P5.1	D31	2.63	b	2,53		2,51		**2,53**	0,06	2,37
19	**29**	P3.3	D31	2,53		2,55		2,51		**2,53**	0,02	0,79
20	**47**	P4.1	D32	2,51		2,54		2,55		**2,53**	0,02	0,79
21	**16**	P5.5	D31	2,52		2,53		2.58	b	**2,54**	0,03	1,18
22	**45**	P5.5	D31	2,54		2,54		2,53		**2,54**	0,01	0,39
23	**54**	P3.2	D31	2,51		2,56		2,55		**2,54**	0,03	1,18
24	**4a**	P9.1	D41	2,53		2.69	b	2,56		**2,56**	0,09	3,52
25	**17**	P5.1	D31	2,58		2,54		2,56		**2,56**	0,02	0,78
26	**55**	P5.5	D31	2,56		2,57		2,54		**2,56**	0,02	0,78
27	**8**	P3.2	D31	2,56		2,57		2,59		**2,57**	0,02	0,78
28	**36**	P3.3	D21	2.54	b	2,58		2,61		**2,58**	0,04	1,55
29	**2**	P5.3	D31	2.50	b	2,60		2,60		**2,59**	0,06	2,32
30	**3**	P3.10	D31	2,58		2.67	b	2,58		**2,59**	0,05	1,93
31	**20**	P5.1	D31	2,59		2,62		2,57		**2,59**	0,03	1,16
32	**41**	P4.1	D31	2,57		2.66	b	2,59		**2,59**	0,05	1,93
33	**42**	P4.1	D31	2,59		2,59		2,59		**2,59**	0,00	0,00
34	**4**	P5.1	D31	2,68		2,65		2.58	b	**2,65**	0,05	1,89
35	**37**	P5.1	D31	2,65		2.73	b	2,63		**2,65**	0,05	1,89
36	**38**	P5.5	D31	2.71	b	2,65		2.56	b	**2,65**	0,08	3,02
37	**11**	P5.1	D31	2,66		2,63		2,68		**2,66**	0,03	1,13
38	**33**	P5.1	D21	2,70		2.85	b	2.62	b	**2,70**	0,12	4,44
39	**24**	P5.1	D21	2.85	b	2,71		2.64	b	**2,71**	0,11	4,06
40	**48**	P4.1	D31	2.67	b	2,72		2.77	b	**2,72**	0,05	1,84
41	**39**	P5.5	D31	2,72		2,71		2.83	b	**2,73**	0,07	2,56
42	**37a**	P9.1	D42	2,75		2,75		2,77		**2,76**	0,01	0,36
43	**38a**	P9.1	D42	2,77		2,76		2,75		**2,76**	0,01	0,36
44	**50**	P4.1	D31	2,82		2.73	b	2,83		**2,81**	0,06	2,14
45	**28**	P3.31	D21	2,80		2,81		2.89	b	**2,82**	0,05	1,77
46	**25**	P5.1	D31	2,84		2,82		2,82		**2,83**	0,01	0,35
47	**55a**	P9.1	D42	2,83		2,84		2,85		**2,84**	0,01	0,35
48	**49**	P4.1	D31	3.05	b	2,85		2,85		**2,86**	0,12	4,20
49	**30**	P6.5	D21.2	3.75	ab	3.61	a	3.60	a	**3,62 ***	0,08	2,21
										Mean	Interlab.std. deviation	
											abs.	rel.%
										2,58	**0,05**	**1,82**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **12,2**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**43**	P4.1	D31	0.29	a	0.29	a	0.29	a	**0,29**	*	0,00	0,00
2	**9**	P5.5	D31	0.66	a	0.66	a	0.70	ab	**0,66**	*	0,02	3,03
3	**36**	P3.3	D21	0.64	ab	0.67	ab	0.66	a	**0,66**	*	0,02	3,03
4	**27**	P6.1	D21	0.67	a	0.67	a	0.67	a	**0,67**		0,00	0,00
5	**13**	P3.3	D21.1	0.68	a	0.70	ab	0.67	ab	**0,68**		0,02	2,94
6	**14**	P4.1	D31	0.68	ab	0.69	a	0.75	ab	**0,69**		0,04	5,80
7	**4a**	P9.1	D41	0.73	b	0,72		0,72		**0,72**		0,01	1,39
8	**26**	P5.1	D31	0.69	b	0,72		0,72		**0,72**		0,02	2,78
9	**1**	P3.21	D21.1	0.71	b	0,73		0,73		**0,73**		0,01	1,37
10	**46**	P5.2	D31	0.74	b	0,73		0.71	b	**0,73**		0,02	2,74
11	**5**	P3.3	D21	0,75		0.78	b	0,75		**0,75**		0,02	2,67
12	**23**	P3.3	D31	0,75		0,75		0,75		**0,75**		0,00	0,00
13	**33**	P5.1	D21	0.76	b	0,75		0.74	b	**0,75**		0,01	1,33
14	**7**	P5.5	D31	0.75	b	0,76		0,76		**0,76**		0,01	1,32
15	**12**	P5.1	D31	0,77		0.76	b	0,77		**0,77**		0,01	1,30
16	**37a**	P9.1	D42	0,77		0,77		0.79	b	**0,77**		0,01	1,30
17	**50**	P4.1	D31	0.76	b	0,77		0.78	b	**0,77**		0,01	1,30
18	**16**	P5.5	D31	0,78		0.75	b	0,78		**0,78**		0,02	2,56
19	**17**	P5.1	D31	0,78		0,78		0.77	b	**0,78**		0,01	1,28
20	**18**	P3.31	D31	0.80	b	0,78		0,78		**0,78**		0,01	1,28
21	**37**	P5.1	D31	0.76	b	0,78		0,78		**0,78**		0,01	1,28
22	**38**	P5.5	D31	0.81	b	0.77	b	0,78		**0,78**		0,02	2,56
23	**41**	P4.1	D31	0,78		0.79	b	0,78		**0,78**		0,01	1,28
24	**44**	P4.1	D31	0,78		0,78		0.79	b	**0,78**		0,01	1,28
25	**4**	P5.1	D31	0,79		0,79		0.76	b	**0,79**		0,02	2,53
26	**11**	P5.1	D31	0,79		0.78	b	0,79		**0,79**		0,01	1,27
27	**45**	P5.5	D31	0,79		0,79		0,79		**0,79**		0,00	0,00
28	**49**	P4.1	D31	0,79		0.78	b	0,79		**0,79**		0,01	1,27
29	**52**	P4.1	D31	0,79		0,79		0.80	b	**0,79**		0,01	1,27
30	**55a**	P9.1	D42	0.78	b	0.82	b	0,79		**0,79**		0,02	2,53
31	**2**	P5.3	D31	0,80		0,80		0,80		**0,80**		0,00	0,00
32	**6**	P3.2	D31	0.81	b	0,80		0,80		**0,80**		0,01	1,25
33	**29**	P3.3	D31	0,80		0.79	b	0,80		**0,80**		0,01	1,25
34	**38a**	P9.1	D42	0.79	b	0,80		0,80		**0,80**		0,01	1,25
35	**40**	P3.11	D31	0,80		0.79	b	0,80		**0,80**		0,01	1,25
36	**8**	P3.2	D31	0,81		0,81		0.80	b	**0,81**		0,01	1,23
37	**20**	P5.1	D31	0,81		0.82	b	0,81		**0,81**		0,01	1,23
38	**39**	P5.5	D31	0,81		0.82	b	0.80	b	**0,81**		0,01	1,23
39	**47**	P4.1	D32	0,81		0,81		0.80	b	**0,81**		0,01	1,23
40	**48**	P4.1	D31	0,81		0,81		0,81		**0,81**		0,00	0,00
41	**54**	P3.2	D31	0,81		0,81		0.82	b	**0,81**		0,01	1,23
42	**3**	P3.10	D31	0,82		0.83	b	0.81	b	**0,82**		0,01	1,22
43	**42**	P4.1	D31	0,82		0,82		0.81	b	**0,82**		0,01	1,22
44	**55**	P5.5	D31	0,82		0,82		0.80	b	**0,82**		0,01	1,22
45	**19**	P5.5	D31	0,85		0.87	b	0.81	b	**0,85**		0,03	3,53
46	**28**	P3.31	D21	0,85		0.88	b	0,85		**0,85**		0,02	2,35
47	**24**	P5.1	D21	0.86	a	0.86	a	0.83	ab	**0,86**		0,02	2,33
48	**30**	P6.5	D21.1	0.93	ab	0.92	a	0.91	ab	**0,92**	*	0,01	1,09
49	**25**	P5.1	D31	0.98	ab	0.96	a	0.96	a	**0,96**	*	0,01	1,04
										Mean		Interlab.std. deviation	
												abs.	rel.%
										0,79		**0,01**	**1,59**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **10,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Mg**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**36**	P3.3	D21	0.82	a	0.82	a	0.84	ab	**0,82**	*	0,01	1,22
2	**27**	P6.1	D21	0.83	a	0.83	a	0.83	a	**0,83**	*	0,00	0,00
3	**4a**	P9.1	D41	0.89	ab	0.90	a	0.91	ab	**0,90**		0,01	1,11
4	**1**	P3.21	D21.1	0.91	a	0.89	ab	0.92	ab	**0,91**		0,02	2,20
5	**9**	P5.5	D31	0.91	a	0.96	ab	0.89	ab	**0,91**		0,04	4,40
6	**23**	P3.3	D31	0.92	a	0.93	ab	0.84	ab	**0,92**		0,05	5,43
7	**46**	P5.2	D31	0.94	ab	0.90	ab	0.92	a	**0,92**		0,02	2,17
8	**37**	P5.1	D31	0.95	b	0.98	b	0,96		**0,96**		0,02	2,08
9	**12**	P5.1	D31	0,97		0,97		0.98	b	**0,97**		0,01	1,03
10	**14**	P4.1	D31	0.89	b	0,97		1.00	b	**0,97**		0,06	6,19
11	**5**	P3.3	D21	1.00	b	0.95	b	0,98		**0,98**		0,03	3,06
12	**13**	P3.3	D21.1	0.97	b	1.00	b	0,98		**0,98**		0,02	2,04
13	**18**	P3.31	D31	0,98		0,98		0,98		**0,98**		0,00	0,00
14	**2**	P5.3	D31	1,00		1,00		1,00		**1,00**		0,00	0,00
15	**26**	P5.1	D31	1,00		1.07	b	0.95	b	**1,00**		0,06	6,00
16	**43**	P4.1	D31	1,00		1.01	b	1,00		**1,00**		0,01	1,00
17	**44**	P4.1	D31	1,00		1.01	b	1,00		**1,00**		0,01	1,00
18	**38a**	P9.1	D42	1,01		1.02	b	1,01		**1,01**		0,01	0,99
19	**45**	P5.5	D31	1,01		1,01		1,01		**1,01**		0,00	0,00
20	**49**	P4.1	D31	1.02	b	1,01		1,01		**1,01**		0,01	0,99
21	**41**	P4.1	D31	1,02		1,02		1,02		**1,02**		0,00	0,00
22	**52**	P4.1	D31	1.03	b	1,02		1.01	b	**1,02**		0,01	0,98
23	**54**	P3.2	D31	1,02		1.00	b	1.03	b	**1,02**		0,02	1,96
24	**4**	P5.1	D31	1.05	b	1.02	b	1,03		**1,03**		0,02	1,94
25	**7**	P5.5	D31	1,03		1,03		1,03		**1,03**		0,00	0,00
26	**11**	P5.1	D31	1,03		1,03		1,03		**1,03**		0,00	0,00
27	**39**	P5.5	D31	1.04	b	1.02	b	1,03		**1,03**		0,01	0,97
28	**8**	P3.2	D31	1,04		1,04		1.03	b	**1,04**		0,01	0,96
29	**17**	P5.1	D31	1.02	b	1,04		1,04		**1,04**		0,01	0,96
30	**20**	P5.1	D31	1,04		1.02	b	1,04		**1,04**		0,01	0,96
31	**29**	P3.3	D31	1,04		1,04		1.06	b	**1,04**		0,01	0,96
32	**38**	P5.5	D31	1.09	b	1.03	b	1,04		**1,04**		0,03	2,88
33	**40**	P3.11	D31	1,04		1.06	b	1.03	b	**1,04**		0,02	1,92
34	**3**	P3.10	D31	1,05		1.06	b	1.04	b	**1,05**		0,01	0,95
35	**37a**	P9.1	D42	1.04	b	1,05		1,05		**1,05**		0,01	0,95
36	**6**	P3.2	D31	1,06		1,06		1.07	b	**1,06**		0,01	0,94
37	**16**	P5.5	D31	1.08	b	1,06		1.00	b	**1,06**		0,04	3,77
38	**24**	P5.1	D21	1.04	b	1.08	b	1,06		**1,06**		0,02	1,89
39	**42**	P4.1	D31	1.05	b	1,06		1,06		**1,06**		0,01	0,94
40	**55**	P5.5	D31	1,06		1,06		1.05	b	**1,06**		0,01	0,94
41	**48**	P4.1	D31	1,07		1,07		1.09	b	**1,07**		0,01	0,93
42	**50**	P4.1	D31	1.04	b	1.11	b	1,07		**1,07**		0,04	3,74
43	**19**	P5.5	D31	1.06	b	1.17	b	1,09		**1,09**		0,06	5,50
44	**55a**	P9.1	D42	1.10	b	1,09		1.07	b	**1,09**		0,02	1,83
45	**47**	P4.1	D32	1,10		1.11	b	1,10		**1,10**		0,01	0,91
46	**33**	P5.1	D21	1,11		1.05	b	1.15	b	**1,11**		0,05	4,50
47	**30**	P6.5	D21.1	1,12		1.13	b	1.09	b	**1,12**		0,02	1,79
48	**28**	P3.31	D21	1.13	a	1.12	ab	1.14	ab	**1,13**		0,01	0,88
49	**25**	P5.1	D31	1.18	a	1.19	ab	1.17	ab	**1,18**		0,01	0,85
										Mean		Interlab.std. deviation	
												abs.	rel.%
										1,03		**0,02**	**1,77**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **4,1**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **1,04**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications			**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.					abs.	rel.%
1	**27**	P6.1	D21	0.48 ab	0.45 a	0.45 a	**0,45 ***	0,02	4,44
2	**14**	P4.1	D31	0.49 ab	0.51 a	0.54 ab	**0,51**	0,03	5,88
3	**1**	P3.21	D21.1	0.53 ab	0.51 ab	0.52 a	**0,52**	0,01	1,92
4	**36**	P3.3	D21	0.52 a	0.52 a	0.52 a	**0,52**	0,00	0,00
5	**46**	P5.2	D31	0.51 ab	0.52 a	0.53 ab	**0,52**	0,01	1,92
6	**4a**	P9.1	D41	0.56 ab	0.53 a	0.53 a	**0,53**	0,02	3,77
7	**9**	P5.5	D31	0.53 a	0.52 ab	0.53 a	**0,53**	0,01	1,89
8	**16**	P5.5	D31	0,56	0,56	0.58 b	**0,56**	0,01	1,79
9	**26**	P5.1	D31	0.55 b	0,56	0,56	**0,56**	0,01	1,79
10	**33**	P5.1	D21	0,57	0.54 b	0.59 b	**0,57**	0,03	5,26
11	**5**	P3.3	D21	0.55 b	0,58	0,58	**0,58**	0,02	3,45
12	**12**	P5.1	D31	0.57 b	0,58	0.62 b	**0,58**	0,03	5,17
13	**18**	P3.31	D31	0.59 b	0,58	0,58	**0,58**	0,01	1,72
14	**23**	P3.3	D31	0.47 b	0.62 b	0,58	**0,58**	0,08	13,79
15	**24**	P5.1	D21	0,58	0,58	0.59 b	**0,58**	0,01	1,72
16	**38a**	P9.1	D42	0,58	0.57 b	0,58	**0,58**	0,01	1,72
17	**43**	P4.1	D31	0.51 b	0.60 b	0,58	**0,58**	0,05	8,62
18	**44**	P4.1	D31	0,58	0.59 b	0,58	**0,58**	0,01	1,72
19	**45**	P5.5	D31	0,58	0,58	0,58	**0,58**	0,00	0,00
20	**49**	P4.1	D31	0.53 b	0,58	0.61 b	**0,58**	0,04	6,90
21	**7**	P5.5	D31	0,59	0,59	0.58 b	**0,59**	0,01	1,69
22	**40**	P3.11	D31	0,59	0.58 b	0.61 b	**0,59**	0,02	3,39
23	**41**	P4.1	D31	0.58 b	0,59	0,59	**0,59**	0,01	1,69
24	**54**	P3.2	D31	0.58 b	0,59	0,59	**0,59**	0,01	1,69
25	**2**	P5.3	D31	0,60	0,60	0,60	**0,60**	0,00	0,00
26	**4**	P5.1	D31	0,60	0.61 b	0.59 b	**0,60**	0,01	1,67
27	**8**	P3.2	D31	0.58 b	0,60	0.62 b	**0,60**	0,02	3,33
28	**11**	P5.1	D31	0,60	0,60	0,60	**0,60**	0,00	0,00
29	**20**	P5.1	D31	0,60	0.59 b	0,60	**0,60**	0,01	1,67
30	**29**	P3.3	D31	0,60	0,60	0,60	**0,60**	0,00	0,00
31	**37**	P5.1	D31	0,60	0,60	0.62 b	**0,60**	0,01	1,67
32	**37a**	P9.1	D42	0,60	0.57 b	0,60	**0,60**	0,02	3,33
33	**38**	P5.5	D31	0.59 b	0,60	0.63 b	**0,60**	0,02	3,33
34	**47**	P4.1	D32	0,60	0.61 b	0,60	**0,60**	0,01	1,67
35	**48**	P4.1	D31	0,60	0,60	0.61 b	**0,60**	0,01	1,67
36	**52**	P4.1	D31	0.59 b	0,60	0,60	**0,60**	0,01	1,67
37	**3**	P3.10	D31	0.60 b	0.63 b	0,61	**0,61**	0,02	3,28
38	**6**	P3.2	D31	0,61	0,61	0,61	**0,61**	0,00	0,00
39	**17**	P5.1	D31	0,61	0.62 b	0,61	**0,61**	0,01	1,64
40	**50**	P4.1	D31	0.60 b	0,61	0.62 b	**0,61**	0,01	1,64
41	**55**	P5.5	D31	0,61	0,61	0.60 b	**0,61**	0,01	1,64
42	**55a**	P9.1	D42	0,61	0,61	0.62 b	**0,61**	0,01	1,64
43	**39**	P5.5	D31	0.64 b	0,62	0.61 b	**0,62**	0,02	3,23
44	**42**	P4.1	D31	0,62	0,62	0,62	**0,62**	0,00	0,00
45	**51**	P9.1	D42	0,62	0,62	0,62	**0,62**	0,00	0,00
46	**13**	P3.3	D21.1	0.64 b	0,63	0.61 b	**0,63**	0,02	3,17
47	**19**	P5.5	D31	0,63	0.61 b	0.68 b	**0,63**	0,04	6,35
48	**28**	P3.31	D21	0.64 a	0.64 a	0.64 a	**0,64**	0,00	0,00
49	**30**	P6.5	D21.1	0.69 a	0.69 a	0.68 ab	**0,69 ***	0,01	1,45
							Mean	Interlab.std. deviation	
								abs.	rel.%
							0,59	**0,01**	**2,57**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **4,1**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Mg**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**27**	P6.1	D21	0.59	ab	0.54	a	0.54	a	**0,54 ***	0,03	5,56
2	**36**	P3.3	D21	0.61	ab	0.62	a	0.63	ab	**0,62 ***	0,01	1,61
3	**14**	P4.1	D31	0.65	a	0.64	ab	0.67	ab	**0,65**	0,02	3,08
4	**1**	P3.21	D21.1	0.65	ab	0.66	a	0.66	a	**0,66**	0,01	1,52
5	**9**	P5.5	D31	0.65	ab	0.66	a	0.69	ab	**0,66**	0,02	3,03
6	**46**	P5.2	D31	0.66	a	0.67	ab	0.66	a	**0,66**	0,01	1,52
7	**2**	P5.3	D31	0,70		0,70		0,70		**0,70**	0,00	0,00
8	**12**	P5.1	D31	0.71	b	0.68	b	0,70		**0,70**	0,02	2,86
9	**18**	P3.31	D31	0.69	b	0,70		0,70		**0,70**	0,01	1,43
10	**37**	P5.1	D31	0.71	b	0,70		0,70		**0,70**	0,01	1,43
11	**43**	P4.1	D31	0.69	b	0,71		0,71		**0,71**	0,01	1,41
12	**4**	P5.1	D31	0.75	b	0,72		0,72		**0,72**	0,02	2,78
13	**4a**	P9.1	D41	0.75	b	0,72		0.70	b	**0,72**	0,03	4,17
14	**16**	P5.5	D31	0,72		0,72		0.73	b	**0,72**	0,01	1,39
15	**45**	P5.5	D31	0,72		0,72		0,72		**0,72**	0,00	0,00
16	**47**	P4.1	D32	0.73	b	0,72		0,72		**0,72**	0,01	1,39
17	**54**	P3.2	D31	0,72		0.70	b	0,72		**0,72**	0,01	1,39
18	**5**	P3.3	D21	0,73		0,73		0,73		**0,73**	0,00	0,00
19	**7**	P5.5	D31	0.74	b	0,73		0,73		**0,73**	0,01	1,37
20	**41**	P4.1	D31	0,73		0.74	b	0,73		**0,73**	0,01	1,37
21	**44**	P4.1	D31	0,73		0,73		0.71	b	**0,73**	0,01	1,37
22	**11**	P5.1	D31	0,74		0,74		0,74		**0,74**	0,00	0,00
23	**13**	P3.3	D21.1	0.73	b	0,74		0.77	b	**0,74**	0,02	2,70
24	**20**	P5.1	D31	0,74		0.75	b	0,74		**0,74**	0,01	1,35
25	**23**	P3.3	D31	0.75	b	0,74		0.71	b	**0,74**	0,02	2,70
26	**29**	P3.3	D31	0.75	b	0.73	b	0,74		**0,74**	0,01	1,35
27	**40**	P3.11	D31	0.73	b	0,74		0.75	b	**0,74**	0,01	1,35
28	**52**	P4.1	D31	0,74		0,74		0,74		**0,74**	0,00	0,00
29	**8**	P3.2	D31	0.74	b	0,75		0,75		**0,75**	0,01	1,33
30	**38**	P5.5	D31	0.77	b	0,75		0.73	b	**0,75**	0,02	2,67
31	**39**	P5.5	D31	0.74	b	0,75		0,75		**0,75**	0,01	1,33
32	**50**	P4.1	D31	0,75		0.73	b	0.76	b	**0,75**	0,02	2,67
33	**55**	P5.5	D31	0,75		0.76	b	0,75		**0,75**	0,01	1,33
34	**3**	P3.10	D31	0.75	b	0.77	b	0,76		**0,76**	0,01	1,32
35	**6**	P3.2	D31	0,76		0,76		0,76		**0,76**	0,00	0,00
36	**17**	P5.1	D31	0,76		0,76		0.75	b	**0,76**	0,01	1,32
37	**19**	P5.5	D31	0.74	b	0.82	b	0,76		**0,76**	0,04	5,26
38	**33**	P5.1	D21	0,76		0.77	b	0.75	b	**0,76**	0,01	1,32
39	**42**	P4.1	D31	0,76		0,76		0.74	b	**0,76**	0,01	1,32
40	**24**	P5.1	D21	0.78	b	0.75	b	0,77		**0,77**	0,02	2,60
41	**38a**	P9.1	D42	0,77		0.78	b	0,77		**0,77**	0,01	1,30
42	**48**	P4.1	D31	0.76	b	0,77		0.78	b	**0,77**	0,01	1,30
43	**26**	P5.1	D31	0.77	b	0,78		0.80	b	**0,78**	0,02	2,56
44	**28**	P3.31	D21	0.77	b	0,78		0.79	b	**0,78**	0,01	1,28
45	**37a**	P9.1	D42	0.76	b	0,78		0,78		**0,78**	0,01	1,28
46	**30**	P6.5	D21.1	0,79		0,79		0.77	b	**0,79**	0,01	1,27
47	**49**	P4.1	D31	0,79		0.83	b	0.77	b	**0,79**	0,03	3,80
48	**55a**	P9.1	D42	0.83	ab	0.85	a	0.85	a	**0,85**	0,01	1,18
49	**25**	P5.1	D31	0.87	ab	0.86	a	0.86	a	**0,86 ***	0,01	1,16
										Mean	Interlab.std. deviation	
											abs.	rel.%
										0,74	**0,01**	**1,75**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,1**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**26**	P5.1	D31	5.61	a	5.59	a	5.48	ab	**5,58**	*	0,07	1,25
2	**12**	P5.1	D31	5.99	ab	5.84	a	5.83	a	**5,86**	*	0,09	1,54
3	**14**	P4.1	D31	5.79	ab	5.88	a	5.95	ab	**5,88**	*	0,08	1,36
4	**30**	P6.5	D21.1	5.96	a	6.05	a	6.01	a	**6,01**		0,05	0,83
5	**36**	P3.3	D28	6.20	a	6.22	a	6.21	a	**6,21**		0,01	0,16
6	**51**	P9.1	D42	6.22	a	6.25	a	6.31	a	**6,26**		0,05	0,80
7	**10**	P5.1	D21.1	6,25		6,26		6.57	b	**6,28**		0,18	2,87
8	**19**	P5.5	D31	6,58		6.47	b	6,55		**6,54**		0,06	0,92
9	**18**	P3.31	D31	6.80	b	6,60		6.50	b	**6,60**		0,15	2,27
10	**9**	P5.5	D31	6,60		6.73	b	6,59		**6,62**		0,08	1,21
11	**11**	P5.1	D31	6.50	b	6,64		6.71	b	**6,64**		0,11	1,66
12	**52**	P4.1	D31	6,64		6,64		6,65		**6,64**		0,01	0,15
13	**16**	P5.5	D31	6,65		6.34	b	6.77	b	**6,65**		0,22	3,31
14	**25**	P5.1	D31	6,62		6,70		6,68		**6,67**		0,04	0,60
15	**40**	P3.11	D31	6,65		6,69		6,73		**6,69**		0,04	0,60
16	**4a**	P9.1	D41	6.59	b	6,77		6,71		**6,71**		0,09	1,34
17	**6**	P3.2	D31	6.79	b	6,66		6,71		**6,71**		0,07	1,04
18	**46**	P5.2	D31	6.94	b	6,71		6,68		**6,72**		0,14	2,08
19	**49**	P4.1	D31	6,73		6,73		6,78		**6,75**		0,03	0,44
20	**17**	P5.1	D31	6,75		6,77		6,76		**6,76**		0,01	0,15
21	**33**	P5.1	D21	6,77		6.50	b	6,82		**6,77**		0,17	2,51
22	**54**	P3.2	D31	6,80		6,76		6.88	b	**6,80**		0,06	0,88
23	**1**	P3.21	D21.1	6,84		6,76		6,84		**6,82**		0,05	0,73
24	**45**	P5.5	D31	6,89		6,91		6,93		**6,91**		0,02	0,29
25	**23**	P3.3	D31	6,93		6,93		6,97		**6,94**		0,02	0,29
26	**7**	P5.5	D31	6,89		6,98		6,96		**6,95**		0,05	0,72
27	**39**	P5.5	D31	6,95		7.06	b	6.88	b	**6,95**		0,09	1,29
28	**41**	P4.1	D31	6,94		6,98		7.06	b	**6,98**		0,06	0,86
29	**38**	P5.5	D31	7.27	b	6,94		7,00		**7,00**		0,18	2,57
30	**44**	P4.1	D31	7,02		7,03		7,06		**7,04**		0,02	0,28
31	**4**	P5.1	D21.1	7,05		7.14	b	7,03		**7,06**		0,06	0,85
32	**28**	P3.31	D21	7,09		7,03		7,11		**7,08**		0,04	0,56
33	**29**	P3.3	D31	7,09		7,10		7,04		**7,08**		0,03	0,42
34	**8**	P3.2	D31	7,09		7.20	b	7,08		**7,11**		0,07	0,98
35	**2**	P5.3	D31	7,10		7,10		7.20	b	**7,12**		0,06	0,84
36	**55**	P5.5	D31	7,19		7,17		7,11		**7,16**		0,04	0,56
37	**38a**	P9.1	D42	7,16		7,19		7,16		**7,17**		0,02	0,28
38	**3**	P3.10	D31	7.02	b	7.28	b	7,18		**7,18**		0,13	1,81
39	**47**	P4.1	D32	7,20		7,18		7,21		**7,20**		0,02	0,28
40	**5**	P21	D28	6.95	b	7.38	b	7,25		**7,25**		0,22	3,03
41	**48**	P4.1	D31	7,24		7,27		7,25		**7,25**		0,02	0,28
42	**55a**	P9.1	D42	7.32	b	7,25		7,21		**7,25**		0,06	0,83
43	**20**	P5.1	D31	7,34		7,27		7,25		**7,28**		0,05	0,69
44	**43**	P4.1	D31	7,25		7,32		7,31		**7,29**		0,04	0,55
45	**37a**	P9.1	D42	7,31		7,35		7,40		**7,35**		0,05	0,68
46	**13**	P3.3	D21.1	7,33		7,37		7,39		**7,36**		0,03	0,41
47	**42**	P4.1	D31	7,43		7,40		7,35		**7,39**		0,04	0,54
48	**37**	P5.1	D31	7.36	b	7,50		7,46		**7,46**		0,07	0,94
49	**50**	P4.1	D31	7.31	b	7,51		7,49		**7,48**		0,11	1,47
										Mean		Interlab.std. deviation	
												abs.	rel.%
										6,92		**0,07**	**1,04**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,1**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **K**
Dimension: **mg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**26**	P5.1	D31	4.11	a	4.10	a	4.46	ab	**4,12 ***	0,21	5,10
2	**12**	P5.1	D31	4.33	a	4.48	ab	4.12	ab	**4,33 ***	0,18	4,16
3	**24**	P5.1	D28	4.54	ab	4.30	ab	4.44	a	**4,44**	0,12	2,70
4	**14**	P4.1	D31	4.34	ab	4.62	a	4.63	a	**4,61**	0,16	3,47
5	**30**	P6.5	D21.1	4,69		4,66		4,71		**4,69**	0,03	0,64
6	**36**	P3.3	D28	4.65	b	4,70		4.77	b	**4,70**	0,06	1,28
7	**46**	P5.2	D31	4.66	b	4,72		4,73		**4,71**	0,04	0,85
8	**19**	P5.5	D31	4,76		4.85	b	4,77		**4,78**	0,05	1,05
9	**18**	P3.31	D31	4,80		4,80		4,80		**4,80**	0,00	0,00
10	**51**	P9.1	D42	4.76	b	4,81		4,85		**4,81**	0,05	1,04
11	**11**	P5.1	D31	4,85		4.74	b	4,87		**4,85**	0,07	1,44
12	**49**	P4.1	D31	4,88		4,85		4.50	b	**4,85**	0,21	4,33
13	**52**	P4.1	D31	4,99		4,95		4.90	b	**4,95**	0,05	1,01
14	**33**	P5.1	D21	4,97		5.06	b	4.88	b	**4,97**	0,09	1,81
15	**23**	P3.3	D31	5,01		5,00		4.67	b	**4,99**	0,19	3,81
16	**40**	P3.11	D31	4,99		5.10	b	4,98		**5,00**	0,07	1,40
17	**16**	P5.5	D31	5.13	b	5,01		4.85	b	**5,01**	0,14	2,79
18	**6**	P3.2	D31	5,03		5,03		5,07		**5,04**	0,02	0,40
19	**4a**	P9.1	D41	5,04		5,06		5.13	b	**5,06**	0,05	0,99
20	**10**	P5.1	D21.1	5.19	b	5,09		4.98	b	**5,09**	0,11	2,16
21	**17**	P5.1	D31	5,08		5.18	b	5,09		**5,10**	0,06	1,18
22	**54**	P3.2	D31	5,10		5,07		5.16	b	**5,10**	0,05	0,98
23	**45**	P5.5	D31	5,14		5,15		5,12		**5,14**	0,02	0,39
24	**1**	P3.21	D21.1	5,16		5.00	b	5,17		**5,15**	0,10	1,94
25	**25**	P5.1	D31	5.10	b	5.25	b	5,19		**5,19**	0,08	1,54
26	**44**	P4.1	D31	5,21		5,19		5,20		**5,20**	0,01	0,19
27	**47**	P4.1	D32	5,20		5,19		5,21		**5,20**	0,01	0,19
28	**2**	P5.3	D31	5,20		5.30	b	5,20		**5,21**	0,06	1,15
29	**28**	P3.31	D21	5,19		5,20		5,23		**5,21**	0,02	0,38
30	**39**	P5.5	D31	5,23		5.09	b	5,25		**5,23**	0,09	1,72
31	**41**	P4.1	D31	5,21		5,24		5,24		**5,23**	0,02	0,38
32	**3**	P3.10	D31	5.41	b	5,24		5,26		**5,26**	0,09	1,71
33	**38a**	P9.1	D42	5,29		5,29		5,27		**5,28**	0,01	0,19
34	**4**	P5.1	D21.1	5,29		5,31		5,27		**5,29**	0,02	0,38
35	**9**	P5.5	D31	5,32		5,26		5,31		**5,30**	0,03	0,57
36	**55**	P5.5	D31	5,33		5,30		5,34		**5,32**	0,02	0,38
37	**8**	P3.2	D31	5,34		5,33		5,32		**5,33**	0,01	0,19
38	**38**	P5.5	D31	5.65	b	5,31		5,33		**5,33**	0,19	3,56
39	**7**	P5.5	D31	5,37		5,35		5,35		**5,36**	0,01	0,19
40	**43**	P4.1	D31	5,39		5,35		5,38		**5,37**	0,02	0,37
41	**29**	P3.3	D31	5,37		5.43	b	5,36		**5,38**	0,04	0,74
42	**42**	P4.1	D31	5,43		5,43		5,45		**5,44**	0,01	0,18
43	**48**	P4.1	D31	5,43		5,46		5,48		**5,46**	0,03	0,55
44	**20**	P5.1	D31	5.57	b	5.44	b	5,52		**5,52**	0,07	1,27
45	**55a**	P9.1	D42	5,59		5,58		5.49	b	**5,57**	0,06	1,08
46	**35**	P3.21	D28	5,58		5,57		5,59		**5,58**	0,01	0,18
47	**13**	P3.3	D21.1	5,61		5.52	b	5,59		**5,59**	0,05	0,89
48	**37**	P5.1	D31	5,67		5,65		5,70		**5,67**	0,03	0,53
49	**50**	P4.1	D31	5.47	b	5,69		5.81	b	**5,69**	0,17	2,99
										Mean	Interlab.std. deviation	
											abs.	rel.%
										5,17	**0,07**	**1,36**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **4,1**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **5,12**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**26**	P5.1	D31	3.34	a	3.36	a	3.35	a	**3,35 ***	0,01	0,30
2	**12**	P5.1	D31	3.44	ab	3.61	a	3.58	a	**3,58**	0,09	2,51
3	**14**	P4.1	D31	3.54	a	3.58	a	3.75	ab	**3,58**	0,11	3,07
4	**16**	P5.5	D31	3,76		3.69	b	3.89	b	**3,76**	0,10	2,66
5	**46**	P5.2	D31	3,76		3.81	b	3,73		**3,76**	0,04	1,06
6	**24**	P5.1	D28	3,82		3,77		3,82		**3,81**	0,03	0,79
7	**36**	P3.3	D28	3,81		3,82		3,80		**3,81**	0,01	0,26
8	**30**	P6.5	D21.1	3.80	b	3,85		3.90	b	**3,85**	0,05	1,30
9	**51**	P9.1	D42	3.82	b	3,87		3,90		**3,87**	0,04	1,03
10	**11**	P5.1	D31	3.86	b	3,91		3.96	b	**3,91**	0,05	1,28
11	**4a**	P9.1	D41	3,92		3,95		4.05	b	**3,95**	0,07	1,77
12	**33**	P5.1	D21	3,98		4,02		3.90	b	**3,98**	0,06	1,51
13	**52**	P4.1	D31	3,98		3,98		3,98		**3,98**	0,00	0,00
14	**18**	P3.31	D31	4,00		4,00		4,00		**4,00**	0,00	0,00
15	**49**	P4.1	D31	3.54	b	4,02		4.15	b	**4,02**	0,32	7,96
16	**23**	P3.3	D31	4,04		4,03		4.19	b	**4,05**	0,09	2,22
17	**1**	P3.21	D21.1	4.14	b	4,05		4,08		**4,08**	0,05	1,23
18	**10**	P5.1	D21.1	4.17	b	4,08		3.92	b	**4,08**	0,13	3,19
19	**54**	P3.2	D31	4,09		4.01	b	4.16	b	**4,09**	0,08	1,96
20	**6**	P3.2	D31	4,16		4,12		4,13		**4,14**	0,02	0,48
21	**19**	P5.5	D31	4,12		4,16		4.31	b	**4,16**	0,10	2,40
22	**45**	P5.5	D31	4,17		4,15		4,16		**4,16**	0,01	0,24
23	**40**	P3.11	D31	4,18		4,21		4,16		**4,18**	0,03	0,72
24	**17**	P5.1	D31	4,17		4,20		4,20		**4,19**	0,02	0,48
25	**39**	P5.5	D31	4,20		4,22		4,19		**4,20**	0,02	0,48
26	**4**	P5.1	D21.1	4.37	b	4,21		4.14	b	**4,21**	0,12	2,85
27	**28**	P3.31	D21	4,22		4,20		4,23		**4,22**	0,02	0,47
28	**41**	P4.1	D31	4,21		4,20		4.29	b	**4,22**	0,05	1,18
29	**3**	P3.10	D31	4,24		4,25		4,25		**4,25**	0,01	0,24
30	**44**	P4.1	D31	4,26		4,29		4.17	b	**4,26**	0,06	1,41
31	**38a**	P9.1	D42	4,28		4,27		4,30		**4,28**	0,02	0,47
32	**29**	P3.3	D31	4,28		4,32		4,27		**4,29**	0,03	0,70
33	**8**	P3.2	D31	4.17	b	4,31		4.45	b	**4,31**	0,14	3,25
34	**47**	P4.1	D32	4,30		4,30		4.39	b	**4,31**	0,05	1,16
35	**38**	P5.5	D31	4.26	b	4,33		4.70	b	**4,33**	0,24	5,54
36	**7**	P5.5	D31	4,34		4,35		4,32		**4,34**	0,02	0,46
37	**25**	P5.1	D31	4.43	b	4,37		4.30	b	**4,37**	0,07	1,60
38	**43**	P4.1	D31	4.10	b	4.62	b	4,37		**4,37**	0,26	5,95
39	**20**	P5.1	D31	4,39		4,38		4,38		**4,38**	0,01	0,23
40	**55**	P5.5	D31	4,39		4,40		4,36		**4,38**	0,02	0,46
41	**48**	P4.1	D31	4,38		4,39		4,39		**4,39**	0,01	0,23
42	**9**	P5.5	D31	4,43		4,46		4,39		**4,43**	0,04	0,90
43	**37a**	P9.1	D42	4,42		4,44		4,48		**4,44**	0,03	0,68
44	**37**	P5.1	D31	4.56	b	4,45		4,49		**4,49**	0,06	1,34
45	**2**	P5.3	D31	4,50		4,50		4,50		**4,50**	0,00	0,00
46	**55a**	P9.1	D42	4,52		4,46		4,50		**4,50**	0,03	0,67
47	**42**	P4.1	D31	4,56		4,54		4,56		**4,55**	0,01	0,22
48	**50**	P4.1	D31	4,53		4,55		4.69	b	**4,55**	0,09	1,98
49	**35**	P3.21	D28	4,57		4,57		4,56		**4,57**	0,01	0,22
										Mean	Interlab.std. deviation	
											abs.	rel.%
										4,20	**0,06**	**1,45**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **2,0**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **K**
Dimension: **mg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**12**	P5.1	D31	4.47	ab	4.73	ab	4.55	a	**4,55 ***	0,13	2,86
2	**26**	P5.1	D31	4.87	ab	4.46	ab	4.55	a	**4,55 ***	0,22	4,84
3	**14**	P4.1	D31	4.70	a	4.73	a	4.75	a	**4,73**	0,03	0,63
4	**30**	P6.5	D21.1	4.74	a	4.80	a	4.85	a	**4,80**	0,06	1,25
5	**43**	P4.1	D31	4.82	ab	4.96	a	4.95	a	**4,93**	0,08	1,62
6	**46**	P5.2	D31	5.10	b	4,98		4,97		**5,00**	0,07	1,40
7	**36**	P3.3	D28	5,02		5,00		5,00		**5,01**	0,01	0,20
8	**16**	P5.5	D31	5,08		5,11		5,13		**5,11**	0,03	0,59
9	**11**	P5.1	D31	5,12		5.02	b	5.20	b	**5,12**	0,09	1,76
10	**18**	P3.31	D31	5,10		5,10		5.20	b	**5,12**	0,06	1,17
11	**19**	P5.5	D31	5,19		5.30	b	5,17		**5,20**	0,07	1,35
12	**52**	P4.1	D31	5,20		5,20		5,25		**5,22**	0,03	0,57
13	**4a**	P9.1	D41	5,17		5.35	b	5,23		**5,23**	0,09	1,72
14	**24**	P5.1	D28	5,25		5.53	b	5.15	b	**5,25**	0,20	3,81
15	**51**	P9.1	D42	5,24		5,27		5,29		**5,27**	0,03	0,57
16	**40**	P3.11	D31	5.38	b	5.22	b	5,29		**5,29**	0,08	1,51
17	**6**	P3.2	D31	5,32		5,33		5,32		**5,32**	0,01	0,19
18	**33**	P5.1	D21	5,32		5.25	b	5.43	b	**5,32**	0,09	1,69
19	**10**	P5.1	D21.1	5,41		5.33	b	5.48	b	**5,41**	0,08	1,48
20	**17**	P5.1	D31	5,43		5,45		5.31	b	**5,42**	0,08	1,48
21	**23**	P3.3	D31	5,41		5.52	b	5,41		**5,43**	0,06	1,10
22	**54**	P3.2	D31	5,40		5,42		5,46		**5,43**	0,03	0,55
23	**45**	P5.5	D31	5,44		5,43		5,46		**5,44**	0,02	0,37
24	**1**	P3.21	D21.1	5,44		5,47		5,49		**5,47**	0,03	0,55
25	**39**	P5.5	D31	5,47		5,48		5,46		**5,47**	0,01	0,18
26	**41**	P4.1	D31	5,50		5.60	b	5,47		**5,51**	0,07	1,27
27	**47**	P4.1	D32	5,50		5,51		5,51		**5,51**	0,01	0,18
28	**44**	P4.1	D31	5,56		5,60		5.45	b	**5,56**	0,08	1,44
29	**25**	P5.1	D31	5,57		5,56		5,62		**5,58**	0,03	0,54
30	**28**	P3.31	D21	5,56		5.73	b	5,60		**5,60**	0,09	1,61
31	**3**	P3.10	D31	5,61		5,55		5,66		**5,61**	0,06	1,07
32	**4**	P5.1	D21.1	5,61		5.72	b	5.44	b	**5,61**	0,14	2,50
33	**2**	P5.3	D31	5,60		5.70	b	5,60		**5,62**	0,06	1,07
34	**8**	P3.2	D31	5,61		5,68		5,66		**5,65**	0,04	0,71
35	**29**	P3.3	D31	5,69		5,60		5,65		**5,65**	0,05	0,88
36	**50**	P4.1	D31	5,65		5.50	b	5.89	b	**5,65**	0,20	3,54
37	**55**	P5.5	D31	5,66		5,68		5,66		**5,67**	0,01	0,18
38	**7**	P5.5	D31	5,71		5,68		5,66		**5,68**	0,03	0,53
39	**38a**	P9.1	D42	5,69		5,70		5,68		**5,69**	0,01	0,18
40	**9**	P5.5	D31	5,75		5,75		5,67		**5,73**	0,05	0,87
41	**20**	P5.1	D31	5,71		5.81	b	5,73		**5,74**	0,05	0,87
42	**35**	P3.21	D28	5,75		5,75		5,77		**5,76**	0,01	0,17
43	**49**	P4.1	D31	6.17	b	5,76		5.66	b	**5,76**	0,27	4,69
44	**38**	P5.5	D31	5.87	b	5,77		5.59	b	**5,77**	0,14	2,43
45	**48**	P4.1	D31	5.66	b	5,83		5,80		**5,79**	0,09	1,55
46	**42**	P4.1	D31	5,83		5,82		5.63	b	**5,80**	0,11	1,90
47	**37**	P5.1	D31	5,94		5,87		5,85		**5,88**	0,05	0,85
48	**13**	P3.3	D21.1	5,97		5,94		5,90		**5,94**	0,04	0,67
49	**55a**	P9.1	D42	6.05	a	6.00	a	6.03	a	**6,03**	0,03	0,50
										Mean	Interlab.std. deviation	
											abs.	rel.%
										5,48	**0,07**	**1,30**

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

*** =not tolerable mean because more than +/- 15 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **4,1**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**13**	P3.3	D21.1	30.70	a	31.90	ab	31.10	a	**31,12**	*	0,61	1,96
2	**36**	P3.3	D21	38.10	a	39.30	ab	37.30	ab	**38,10**	*	1,01	2,65
3	**27**	P6.1	D21	46.30	a	46.00	a	45.80	a	**46,03**		0,25	0,54
4	**52**	P4.1	D31	46.80	a	46.90	a	47.50	a	**47,07**		0,38	0,81
5	**14**	P4.1	D31	47.60	a	48.20	a	50.00	ab	**48,20**		1,25	2,59
6	**1**	P3.21	D21.1	48.80	a	49.00	a	48.80	a	**48,87**		0,12	0,25
7	**4a**	P9.1	D41	50.20	b	51,00		53.00	b	**51,00**		1,44	2,82
8	**26**	P5.1	D31	51,30		51,50		51,10		**51,30**		0,20	0,39
9	**9**	P5.5	D31	51,30		51,50		51,30		**51,37**		0,12	0,23
10	**16**	P5.5	D31	53.40	b	50.10	b	51,70		**51,70**		1,65	3,19
11	**49**	P4.1	D31	56.40	b	51.60	b	52,40		**52,40**		2,57	4,90
12	**5**	P3.3	D21	53.50	b	52,00		52,50		**52,50**		0,76	1,45
13	**40**	P3.11	D31	53,30		53,50		53,40		**53,40**		0,10	0,19
14	**7**	P5.5	D31	53,80		53,30		53,80		**53,63**		0,29	0,54
15	**18**	P3.31	D31	55.20	b	54,00		53,80		**54,12**		0,76	1,40
16	**25**	P5.1	D31	54,60		53,90		54,30		**54,27**		0,35	0,64
17	**24**	P5.1	D21	54,70		53.40	b	55,20		**54,70**		0,93	1,70
18	**46**	P5.2	D31	56.50	b	54,70		54,50		**54,82**		1,10	2,01
19	**11**	P5.1	D31	55,10		54,50		55,10		**54,90**		0,35	0,64
20	**20**	P5.1	D31	53.40	b	60.30	b	55,10		**55,10**		3,59	6,52
21	**54**	P3.2	D31	55,10		54,60		55.90	b	**55,10**		0,66	1,20
22	**37**	P5.1	D31	54,90		55,60		55,40		**55,30**		0,36	0,65
23	**33**	P5.1	D21	55,40		53.90	b	56.90	b	**55,40**		1,50	2,71
24	**12**	P5.1	D31	57.60	b	54.40	b	55,70		**55,70**		1,61	2,89
25	**6**	P3.2	D31	56,40		56,00		56,00		**56,13**		0,23	0,41
26	**50**	P4.1	D31	55,80		56,70		56,10		**56,17**		0,46	0,82
27	**55a**	P9.1	D42	56,40		56,60		55,90		**56,30**		0,36	0,64
28	**47**	P4.1	D32	56,40		56,50		56,70		**56,53**		0,15	0,27
29	**4**	P5.1	D31	56,70		57,20		53.90	b	**56,70**		1,78	3,14
30	**2**	P5.3	D31	56,70		56,70		56,80		**56,73**		0,06	0,11
31	**45**	P5.5	D31	57,00		56.00	b	57,00		**56,78**		0,58	1,02
32	**8**	P3.2	D31	57,10		56,50		60.20	b	**57,10**		1,99	3,49
33	**3**	P3.10	D31	57,00		58.00	b	57,00		**57,22**		0,58	1,01
34	**43**	P4.1	D31	57,20		57,30		57,60		**57,37**		0,21	0,37
35	**17**	P5.1	D31	57,60		57,60		57,00		**57,40**		0,35	0,61
36	**55**	P5.5	D31	58,50		58,40		57.30	b	**58,23**		0,67	1,15
37	**29**	P3.3	D31	58,10		58,80		59,10		**58,73**		0,51	0,87
38	**44**	P4.1	D32	59.70	b	58,10		58,80		**58,80**		0,80	1,36
39	**39**	P5.5	D35	59,00		60.10	b	58,60		**59,02**		0,78	1,32
40	**38a**	P9.1	D42	59,70		59,50		59,10		**59,43**		0,31	0,52
41	**48**	P4.1	D31	59,30		60,00		59,30		**59,52**		0,40	0,67
42	**38**	P5.5	D31	60.70	b	59,80		59,10		**59,80**		0,80	1,34
43	**42**	P4.1	D31	60,00		60,00		62.00	b	**60,22**		1,15	1,91
44	**23**	P3.3	D31	56.60	b	60,30		63.10	b	**60,30**		3,26	5,41
45	**10**	P5.1	D21.1	65.20	b	60,20		60,10		**60,37**		2,92	4,84
46	**37a**	P9.1	D42	62.10	a	62.80	a	62.50	a	**62,47**		0,35	0,56
47	**28**	P5.1	D21	63.60	ab	65.70	ab	64.60	a	**64,60**		1,05	1,63
48	**41**	P4.1	D31	85.90	ab	92.50	ab	88.00	a	**88,00**	*	3,37	3,83

Mean	Interlab.std. deviation	
	abs.	rel.%
55,58	**0,94**	**1,67**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,3**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Zn**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**13**	P3.3	D21.1	18.60	a	21.10	ab	18.40	a	**18,72**	*	1,50	8,01
2	**36**	P3.3	D21	26.80	a	25.60	a	26.10	a	**26,10**	*	0,60	2,30
3	**52**	P4.1	D31	32.00	a	31.90	a	31.80	a	**31,90**	*	0,10	0,31
4	**27**	P6.1	D21	34.20	a	34.20	a	36.10	ab	**34,42**		1,10	3,20
5	**1**	P3.21	D21.1	35.60	a	33.40	ab	36.60	ab	**35,60**		1,64	4,61
6	**14**	P4.1	D31	34.20	ab	36.70	a	37.50	ab	**36,70**		1,72	4,69
7	**54**	P3.2	D31	38,60		39,00		38,10		**38,58**		0,45	1,17
8	**18**	P3.31	D31	38,60		39.80	b	38,40		**38,72**		0,76	1,96
9	**29**	P3.3	D31	28.60	b	39,20		39,40		**39,08**		6,18	15,81
10	**12**	P5.1	D31	39,40		40.70	b	38,70		**39,40**		1,01	2,56
11	**46**	P5.2	D31	40,20		39,40		39,20		**39,52**		0,53	1,34
12	**16**	P5.5	D31	39,20		39,70		40,00		**39,63**		0,40	1,01
13	**9**	P5.5	D31	40,90		39,50		40,20		**40,20**		0,70	1,74
14	**33**	P5.1	D21	39,90		40,50		40,20		**40,20**		0,30	0,75
15	**25**	P5.1	D31	40,30		40,10		40,40		**40,27**		0,15	0,37
16	**26**	P5.1	D31	40,10		40,60		40,20		**40,30**		0,26	0,65
17	**7**	P5.5	D31	40,50		39,80		40,70		**40,38**		0,47	1,16
18	**11**	P5.1	D31	40,70		40,60		40,70		**40,67**		0,06	0,15
19	**4a**	P9.1	D41	39.50	b	40,80		41,40		**40,80**		0,97	2,38
20	**8**	P3.2	D31	41,00		41,40		40,80		**41,07**		0,31	0,75
21	**24**	P5.1	D21	39.90	b	42.40	b	41,20		**41,20**		1,25	3,03
22	**47**	P4.1	D32	41,30		41,20		41,30		**41,27**		0,06	0,15
23	**40**	P3.11	D31	41,50		42.70	b	41,10		**41,52**		0,83	2,00
24	**55**	P5.5	D31	42,10		41,80		41,90		**41,93**		0,15	0,36
25	**5**	P3.3	D21	41.00	b	42,50		42,00		**42,00**		0,76	1,81
26	**45**	P5.5	D31	42,00		42,00		42,00		**42,00**		0,00	0,00
27	**37**	P5.1	D31	42,00		42,50		42,10		**42,20**		0,26	0,62
28	**20**	P5.1	D31	42,40		41.00	b	43.60	b	**42,40**		1,30	3,07
29	**50**	P4.1	D31	42,40		42,10		43.80	b	**42,47**		0,91	2,14
30	**6**	P3.2	D31	42,20		42,40		43,00		**42,52**		0,42	0,99
31	**17**	P5.1	D31	43,10		42,80		42,20		**42,73**		0,46	1,08
32	**4**	P5.1	D31	44.00	b	42,70		42,60		**42,87**		0,78	1,82
33	**3**	P3.10	D31	42.00	b	44.00	b	43,00		**43,00**		1,00	2,33
34	**43**	P4.1	D31	42,80		44.60	b	43,10		**43,17**		0,96	2,22
35	**44**	P4.1	D32	42.10	b	43,20		43,60		**43,18**		0,78	1,81
36	**55a**	P9.1	D42	44.70	b	43,50		43,20		**43,57**		0,79	1,81
37	**39**	P5.5	D35	44,40		44,10		44,10		**44,20**		0,17	0,38
38	**42**	P4.1	D31	44,00		44,00		45.00	b	**44,22**		0,58	1,31
39	**2**	P5.3	D31	44,30		45.40	b	43.40	b	**44,30**		1,00	2,26
40	**38**	P5.5	D31	46.70	b	44,60		44,20		**44,62**		1,34	3,00
41	**48**	P4.1	D31	45,10		44,30		45,00		**44,83**		0,44	0,98
42	**38a**	P9.1	D42	45,70		45,70		45,30		**45,57**		0,23	0,50
43	**23**	P3.3	D31	43.90	b	46,10		46,80		**46,10**		1,51	3,28
44	**10**	P5.1	D21.1	50.00	b	43.50	b	46,20		**46,20**		3,27	7,08
45	**49**	P4.1	D31	49.90	ab	44.80	ab	47.30	a	**47,30**		2,55	5,39
46	**28**	P5.1	D21	47.80	a	49.50	ab	47.90	a	**48,07**		0,95	1,98
47	**37a**	P9.1	D42	49.60	a	50.30	a	50.10	a	**50,00**		0,36	0,72
48	**41**	P4.1	D31	55.60	ab	51.70	a	51.60	a	**51,87**	*	2,28	4,40

Mean	Interlab.std. deviation	
	abs.	rel.%
41,79	**0,93**	**2,32**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,3**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **42,12**

ICP-Forests 5th needle/leaf labtest 01/02

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	**52**	P4.1	D31	10.70	a	10.30	a	10.30	a	**10,41**	*	0,23	2,21
2	**36**	P3.3	D21	12.80	ab	15.00	ab	13.40	a	**13,40**	*	1,14	8,51
3	**13**	P3.3	D21.1	19.50	ab	18.40	a	17.50	ab	**18,40**		1,00	5,43
4	**14**	P4.1	D31	18.50	a	18.60	a	19.60	ab	**18,66**		0,61	3,27
5	**1**	P3.21	D21.1	18.70	a	18.50	a	18.80	a	**18,67**		0,15	0,80
6	**27**	P6.1	D21	18.70	a	18.70	a	19.50	ab	**18,81**		0,46	2,45
7	**12**	P5.1	D31	20,60		20,70		19.50	b	**20,54**		0,67	3,26
8	**46**	P5.2	D31	20,50		20,40		21.50	b	**20,56**		0,61	2,97
9	**16**	P5.5	D31	20,70		20,30		21.30	b	**20,70**		0,50	2,42
10	**54**	P3.2	D31	21,20		20,50		20,70		**20,71**		0,36	1,74
11	**18**	P3.31	D31	21.80	b	20,90		20.00	b	**20,90**		0,90	4,31
12	**9**	P5.5	D31	21,10		20,90		21,60		**21,11**		0,36	1,71
13	**33**	P5.1	D21	21,40		20.60	b	22.80	b	**21,40**		1,11	5,19
14	**4a**	P9.1	D41	20.90	b	21,80		21,60		**21,59**		0,47	2,18
15	**29**	P3.3	D31	22.70	b	21,60		19.90	b	**21,60**		1,41	6,53
16	**7**	P5.5	D31	21,60		23.00	b	21,40		**21,61**		0,87	4,03
17	**11**	P5.1	D31	21,80		21,70		21,60		**21,70**		0,10	0,46
18	**8**	P3.2	D31	21,60		21,70		22.90	b	**21,76**		0,72	3,31
19	**37**	P5.1	D31	21,80		22,00		21,50		**21,79**		0,25	1,15
20	**45**	P5.5	D31	23.00	b	22,00		22,00		**22,11**		0,58	2,62
21	**47**	P4.1	D32	22,40		22,60		22,50		**22,50**		0,10	0,44
22	**6**	P3.2	D31	22,60		22,50		22,50		**22,53**		0,06	0,27
23	**55a**	P9.1	D42	22,60		22,60		22,60		**22,60**		0,00	0,00
24	**40**	P3.11	D31	22,50		22,70		22,90		**22,70**		0,20	0,88
25	**23**	P3.3	D31	21.80	b	23,20		22,80		**22,80**		0,72	3,16
26	**50**	P4.1	D31	22,70		23,20		22,80		**22,86**		0,26	1,14
27	**55**	P5.5	D31	23,00		23,20		22,70		**22,99**		0,25	1,09
28	**17**	P5.1	D31	22,80		23,10		23.60	b	**23,10**		0,40	1,73
29	**3**	P3.10	D31	23,00		24.00	b	23,00		**23,11**		0,58	2,51
30	**42**	P4.1	D31	24.00	b	23,00		23,00		**23,11**		0,58	2,51
31	**24**	P5.1	D21	23,00		23,30		23,10		**23,13**		0,15	0,65
32	**39**	P5.5	D35	23,50		23,20		23,10		**23,26**		0,21	0,90
33	**4**	P5.1	D31	25.30	b	23,60		21.70	b	**23,60**		1,80	7,63
34	**44**	P4.1	D32	23,40		23,70		24,10		**23,70**		0,35	1,48
35	**48**	P4.1	D31	24.40	b	23,80		23,60		**23,81**		0,42	1,76
36	**25**	P5.1	D31	23,90		24,30		24,10		**24,10**		0,20	0,83
37	**38**	P5.5	D31	24,00		24,30		26.70	b	**24,30**		1,48	6,09
38	**38a**	P9.1	D42	24,00		24,60		24,60		**24,49**		0,35	1,43
39	**5**	P3.3	D21	25.00	b	24,50		23.50	b	**24,50**		0,76	3,10
40	**43**	P4.1	D31	24,40		24,80		24,50		**24,56**		0,21	0,86
41	**2**	P5.3	D31	24,80		24,90		24,70		**24,80**		0,10	0,40
42	**10**	P5.1	D21.1	26.60	b	25,60		25.00	b	**25,60**		0,81	3,16
43	**49**	P4.1	D31	29.70	b	26,00		26,00		**26,11**		2,14	8,20
44	**26**	P5.1	D31	26,20		24.50	b	26.70	b	**26,20**		1,15	4,39
45	**28**	P5.1	D21	26.60	a	26.70	a	25.70	ab	**26,54**		0,55	2,07
46	**20**	P5.1	D31	27.20	a	27.20	a	29.20	ab	**27,31**	*	1,15	4,21
47	**37a**	P9.1	D42	30.40	a	30.70	a	30.70	a	**30,60**	*	0,17	0,56
48	**41**	P4.1	D31	31.20	a	41.40	ab	27.20	ab	**31,20**	*	7,32	23,46

Mean	Interlab.std. deviation	
	abs.	rel.%
22,67	**0,73**	**3,11**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **10,4**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Zn**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**36**	P3.3	D21	37.50	a	40.00	ab	37.70	a	**37,82**	*	1,39	3,68
2	**52**	P4.1	D31	39.90	a	39.80	a	40.00	a	**39,90**	*	0,10	0,25
3	**13**	P3.3	D21.1	41.60	a	41.00	a	40.10	ab	**41,00**		0,75	1,83
4	**27**	P6.1	D21	41.70	a	41.50	a	39.90	ab	**41,38**		0,99	2,39
5	**1**	P3.21	D21.1	41.90	a	41.50	a	41.70	a	**41,70**		0,20	0,48
6	**14**	P4.1	D31	46,00		46,10		46,20		**46,10**		0,10	0,22
7	**9**	P5.5	D31	46,20		46,20		46,00		**46,13**		0,12	0,26
8	**4a**	P9.1	D41	45,60		46,30		48.40	b	**46,30**		1,46	3,15
9	**18**	P3.31	D31	44.70	b	46,60		47,00		**46,58**		1,23	2,64
10	**54**	P3.2	D31	47,00		46,50		46,50		**46,67**		0,29	0,62
11	**16**	P5.5	D31	46,90		47,40		47,10		**47,13**		0,25	0,53
12	**12**	P5.1	D31	48,00		47.00	b	47,90		**47,73**		0,55	1,15
13	**43**	P4.1	D31	47.20	b	48,00		49.70	b	**48,00**		1,28	2,67
14	**7**	P5.5	D31	48,40		48,30		47,60		**48,13**		0,44	0,91
15	**46**	P5.2	D31	48,00		48,00		48,80		**48,22**		0,46	0,95
16	**33**	P5.1	D21	48,50		49,10		49,70		**49,10**		0,60	1,22
17	**40**	P3.11	D31	48,80		49,50		49,10		**49,13**		0,35	0,71
18	**47**	P4.1	D32	49,10		49,10		49,60		**49,27**		0,29	0,59
19	**26**	P5.1	D31	48,90		49,90		49,30		**49,32**		0,50	1,01
20	**11**	P5.1	D31	49,20		49,40		49,70		**49,43**		0,25	0,51
21	**8**	P3.2	D31	48.90	b	49,80		50,00		**49,68**		0,59	1,19
22	**55**	P5.5	D31	49,60		50,00		49,60		**49,73**		0,23	0,46
23	**20**	P5.1	D31	49,90		55.60	b	48.40	b	**49,90**		3,80	7,62
24	**25**	P5.1	D31	50,10		49,80		49,90		**49,93**		0,15	0,30
25	**45**	P5.5	D31	50,00		50,00		51.00	b	**50,22**		0,58	1,15
26	**4**	P5.1	D31	51,20		50,50		49.00	b	**50,50**		1,12	2,22
27	**5**	P3.3	D21	50,50		50,00		51.50	b	**50,50**		0,76	1,50
28	**50**	P4.1	D31	48.90	b	50,60		51.50	b	**50,60**		1,32	2,61
29	**29**	P3.3	D31	52.00	b	50,50		50,70		**50,82**		0,81	1,59
30	**17**	P5.1	D31	49.70	b	51,70		51,00		**51,00**		1,01	1,98
31	**37**	P5.1	D31	51,30		50,90		51,50		**51,23**		0,31	0,61
32	**6**	P3.2	D31	51,30		51,80		51,40		**51,50**		0,26	0,50
33	**44**	P4.1	D32	54.80	b	51,60		50.40	b	**51,60**		2,27	4,40
34	**3**	P3.10	D31	51.00	b	52,00		52,00		**51,78**		0,58	1,12
35	**24**	P5.1	D21	50.60	b	51,80		52,20		**51,78**		0,83	1,60
36	**55a**	P9.1	D42	51,80		51,80		52,50		**52,02**		0,40	0,77
37	**42**	P4.1	D31	53.00	b	52,00		52,00		**52,22**		0,58	1,11
38	**49**	P4.1	D31	53,40		51.50	b	52,90		**52,90**		0,98	1,85
39	**10**	P5.1	D21.1	53,20		51.80	b	53,20		**52,98**		0,81	1,53
40	**2**	P5.3	D31	52.10	b	53,80		53,40		**53,38**		0,89	1,67
41	**39**	P5.5	D35	54,10		52.40	b	55.70	b	**54,10**		1,65	3,05
42	**38**	P5.5	D31	54,40		54,60		54,20		**54,40**		0,20	0,37
43	**48**	P4.1	D31	54.00	b	55,40		55,20		**55,08**		0,76	1,38
44	**38a**	P9.1	D42	54,90		55,10		55,80		**55,22**		0,47	0,85
45	**23**	P3.3	D31	55.30	ab	57.10	a	59.30	ab	**57,10**		2,00	3,50
46	**28**	P5.1	D21	59.40	a	59.90	a	58.90	a	**59,40**		0,50	0,84
47	**41**	P4.1	D31	59.10	ab	61.40	ab	60.40	a	**60,40**	*	1,15	1,90
48	**37a**	P9.1	D42	61.40	a	61.50	a	61.50	a	**61,47**	*	0,06	0,10

Mean	Interlab.std. deviation	
	abs.	rel.%
50,13	**0,76**	**1,53**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,3**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**7**	P5.5	D31	265.00	a	264.00	a	263.00	a	**264,00**	1,00	0,38
2	**1**	P3.21	D21.1	271.00	a	267.00	ab	275.00	ab	**271,00**	4,00	1,48
3	**49**	P4.1	D31	275.80	a	270.60	a	274.80	a	**274,19**	2,76	1,01
4	**14**	P4.1	D31	274,00		275,00		281.00	b	**275,61**	3,79	1,38
5	**10**	P5.1	D21.1	280,30		292.50	b	280,70		**281,61**	6,93	2,46
6	**27**	P6.1	D21	284,00		280,00		281,00		**281,61**	2,08	0,74
7	**45**	P5.5	D31	283,00		286,00		282,00		**283,61**	2,08	0,73
8	**17**	P5.1	D31	288,00		287,00		290,00		**288,33**	1,53	0,53
9	**47**	P4.1	D32	289,00		291,00		289,00		**289,67**	1,15	0,40
10	**16**	P5.5	D31	293,00		282.00	b	290,00		**290,00**	5,69	1,96
11	**42**	P4.1	D31	294.00	b	288,00		290,00		**290,11**	3,06	1,05
12	**18**	P3.31	D31	294,00		291,00		285.00	b	**291,00**	4,58	1,57
13	**4a**	P9.1	D41	292,00		294,00		296,00		**294,00**	2,00	0,68
14	**20**	P5.1	D31	294,00		295,00		294,00		**294,33**	0,58	0,20
15	**2**	P5.3	D31	297,00		293,00		294,00		**294,61**	2,08	0,71
16	**25**	P5.1	D31	294,00		296,00		294,00		**294,67**	1,15	0,39
17	**36**	P3.3	D21	289.00	b	295,00		300.00	b	**295,00**	5,51	1,87
18	**11**	P5.1	D31	297,00		294,00		298,00		**296,39**	2,08	0,70
19	**4**	P5.1	D31	301.50	b	296,80		289.60	b	**296,80**	5,99	2,02
20	**43**	P4.1	D31	298,00		298,00		295,00		**297,00**	1,73	0,58
21	**52**	P4.1	D31	297,20		297,50		297,80		**297,50**	0,30	0,10
22	**23**	P3.3	D31	292.00	b	298,00		305.00	b	**298,00**	6,51	2,18
23	**50**	P4.1	D31	297,00		298,00		304.00	b	**298,61**	3,79	1,27
24	**41**	P4.1	D31	300,00		301,00		299,00		**300,00**	1,00	0,33
25	**44**	P4.1	D31	300,00		300,00		300,00		**300,00**	0,00	0,00
26	**3**	P3.10	D31	303,00		310.00	b	302,00		**303,61**	4,36	1,44
27	**29**	P3.3	D31	305,00		310.00	b	295.00	b	**305,00**	7,64	2,50
28	**13**	P3.3	D21.1	307,00		307,00		299.00	b	**305,89**	4,62	1,51
29	**48**	P4.1	D31	307,00		310,00		305,00		**307,11**	2,52	0,82
30	**40**	P3.11	D31	311,00		307,00		309,00		**309,00**	2,00	0,65
31	**9**	P5.5	D31	312,00		311,00		298.00	b	**310,39**	7,81	2,52
32	**55**	P5.5	D31	312,00		311,00		305.00	b	**310,39**	3,79	1,22
33	**5**	P3.3	D21	315,00		310.00	b	315,00		**313,89**	2,89	0,92
34	**28**	P5.1	D21	308.00	b	324.00	b	317,00		**317,00**	8,02	2,53
35	**6**	P3.2	D31	321,00		315,00		318,00		**318,00**	3,00	0,94
36	**12**	P5.1	D31	319,90		300.80	b	324.30	b	**319,90**	12,49	3,90
37	**33**	P5.1	D21	321,00		319,00		323,00		**321,00**	2,00	0,62
38	**55a**	P9.1	D42	320,00		324,00		323,00		**322,39**	2,08	0,65
39	**24**	P5.1	D21	323,00		318.00	b	327.00	b	**323,00**	4,51	1,40
40	**39**	P5.5	D31	329.00	b	323,00		319.00	b	**323,00**	5,03	1,56
41	**38**	P5.5	D31	340.00	b	318.00	b	326,00		**326,00**	11,14	3,42
42	**38a**	P9.1	D42	326,00		324,00		328,00		**326,00**	2,00	0,61
43	**26**	P5.1	D31	311.00	b	327,00		329,00		**326,89**	9,87	3,02
44	**37a**	P9.1	D42	328,00		330,00		329,00		**329,00**	1,00	0,30
45	**37**	P5.1	D31	334,00		340.00	b	331,00		**334,00**	4,58	1,37
46	**54**	P3.2	D31	337.00	a	342.00	ab	333.00	ab	**337,00**	4,51	1,34
47	**8**	P3.2	D31	338.00	a	342.00	a	337.00	a	**338,61**	2,65	0,78
48	**46**	P5.2	D31	342.40	a	344.40	a	347.10	a	**344,51**	2,36	0,69
49	**51**	P9.1	D42	361.00	a	360.00	a	362.00	a	**361,00**	1,00	0,28
										Mean	Interlab.std. deviation	
											abs.	rel.%
										304,90	**3,74**	**1,22**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **0,0**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Mn**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**27**	P6.1	D21	268.00	a	266.00	a	269.00	a	**267,67**	1,53	0,57
2	**4a**	P9.1	D41	282.00	a	283.00	a	285.00	a	**283,33**	1,53	0,54
3	**49**	P4.1	D31	293.90	ab	278.00	ab	289.70	a	**289,70**	8,24	2,84
4	**7**	P5.5	D31	289,00		293,00		291,00		**291,00**	2,00	0,69
5	**29**	P3.3	D31	294,00		308.00	b	296,00		**296,11**	7,57	2,56
6	**14**	P4.1	D31	296,00		297,00		314.00	b	**297,61**	10,12	3,40
7	**45**	P5.5	D31	301,00		300,00		299,00		**300,00**	1,00	0,33
8	**18**	P3.31	D31	303,00		305,00		301,00		**303,00**	2,00	0,66
9	**40**	P3.11	D31	298.00	b	307.00	b	303,00		**303,00**	4,51	1,49
10	**1**	P3.21	D21.1	305,00		299.00	b	305,00		**303,89**	3,46	1,14
11	**24**	P5.1	D21	308,00		304,00		306,00		**306,00**	2,00	0,65
12	**42**	P4.1	D31	305,00		305,00		309,00		**306,11**	2,31	0,75
13	**6**	P3.2	D31	305,00		306,00		310,00		**306,61**	2,65	0,86
14	**52**	P4.1	D31	308,50		308,70		309,20		**308,80**	0,36	0,12
15	**44**	P4.1	D31	310,00		320.00	b	310,00		**311,11**	5,77	1,85
16	**17**	P5.1	D31	322.00	b	310,00		312,00		**312,11**	6,43	2,06
17	**23**	P3.3	D31	314,00		307.00	b	313,00		**312,39**	3,79	1,21
18	**47**	P4.1	D32	311,00		313,00		316,00		**313,11**	2,52	0,80
19	**10**	P5.1	D21.1	314,20		310,60		315,10		**313,54**	2,38	0,76
20	**43**	P4.1	D31	312,00		316,00		313,00		**313,61**	2,08	0,66
21	**25**	P5.1	D31	314,00		315,00		312,00		**313,67**	1,53	0,49
22	**54**	P3.2	D31	317,00		315,00		319,00		**317,00**	2,00	0,63
23	**36**	P3.3	D21	317,00		326.00	b	315,00		**317,11**	5,86	1,85
24	**11**	P5.1	D31	319,00		318,00		319,00		**318,67**	0,58	0,18
25	**20**	P5.1	D31	321,00		318,00		319,00		**319,33**	1,53	0,48
26	**55a**	P9.1	D42	320,00		322,00		317,00		**319,89**	2,52	0,79
27	**12**	P5.1	D31	317,60		321,60		321,40		**320,39**	2,25	0,70
28	**46**	P5.2	D31	320,50		312.60	b	322,80		**320,50**	5,35	1,67
29	**16**	P5.5	D31	321,00		320,00		322,00		**321,00**	1,00	0,31
30	**41**	P4.1	D31	319,00		322,00		322,00		**321,00**	1,73	0,54
31	**2**	P5.3	D31	322,00		327.00	b	318.00	b	**322,00**	4,51	1,40
32	**4**	P5.1	D31	321,90		322,60		323,90		**322,80**	1,01	0,31
33	**38a**	P9.1	D42	323,00		325,00		324,00		**324,00**	1,00	0,31
34	**50**	P4.1	D31	322,00		325,00		330.00	b	**325,00**	4,04	1,24
35	**8**	P3.2	D31	327,00		330,00		324,00		**327,00**	3,00	0,92
36	**5**	P3.3	D21	330,00		330,00		320.00	b	**328,89**	5,77	1,75
37	**33**	P5.1	D21	330,00		340.00	b	325.00	b	**330,00**	7,64	2,32
38	**26**	P5.1	D31	332,00		331,00		340.00	b	**332,61**	4,93	1,48
39	**3**	P3.10	D31	332,00		334,00		332,00		**332,67**	1,15	0,35
40	**28**	P5.1	D21	333,00		326.00	b	349.00	b	**333,00**	11,79	3,54
41	**48**	P4.1	D31	333,00		332,00		337,00		**333,61**	2,65	0,79
42	**55**	P5.5	D31	336,00		333,00		334,00		**334,33**	1,53	0,46
43	**9**	P5.5	D31	332.30	b	336,80		338,50		**336,54**	3,20	0,95
44	**13**	P3.3	D21.1	336,00		335,00		341.00	b	**336,61**	3,21	0,95
45	**39**	P5.5	D31	340,00		334.00	b	339,00		**338,39**	3,21	0,95
46	**51**	P9.1	D42	343,00		344,00		350.00	b	**344,61**	3,79	1,10
47	**37**	P5.1	D31	338.00	b	345,00		351.00	b	**345,00**	6,51	1,89
48	**38**	P5.5	D31	373.00	ab	353.00	a	355.00	a	**355,11**	11,02	3,10
49	**37a**	P9.1	D42	389.00	ab	380.00	a	378.00	a	**380,11**	5,86	1,54
										Mean	Interlab.std. deviation	
											abs.	rel.%
										318,30	**3,72**	**1,16**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **0,0**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **323,40**

ICP-Forests 5th needle/leaf labtest 01/02

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	**29**	P3.3	D31	1050.00	a	1079.00	ab	1043.00	a	**1052,06**	19,09	1,81
2	**4a**	P9.1	D41	1094.00	a	1093.00	a	1106.00	a	**1097,67**	7,23	0,66
3	**33**	P5.1	D21	1115.00	a	1120.00	a	1110.00	a	**1115,00**	5,00	0,45
4	**27**	P6.1	D21	1150.00	a	1204.00	ab	1097.00	ab	**1150,00**	53,50	4,65
5	**45**	P5.5	D31	1174,00		1177,00		1170,00		**1173,67**	3,51	0,30
6	**49**	P4.1	D31	1186,60		1160.60	b	1219.80	b	**1186,60**	29,67	2,50
7	**40**	P3.11	D31	1209,00		1193,00		1208,00		**1203,33**	8,96	0,74
8	**18**	P3.31	D31	1219,00		1208,00		1182.00	b	**1207,94**	19,00	1,57
9	**10**	P5.1	D21.1	1205,00		1216,50		1207,60		**1209,70**	6,03	0,50
10	**20**	P5.1	D31	1266.00	b	1215,00		1224,00		**1225,06**	27,22	2,22
11	**24**	P5.1	D21	1244.00	b	1152.00	b	1226,00		**1226,00**	48,76	3,98
12	**52**	P4.1	D31	1230,00		1227,00		1229,00		**1228,67**	1,53	0,12
13	**14**	P4.1	D31	1221,00		1231,00		1282.00	b	**1231,56**	32,72	2,66
14	**23**	P3.3	D31	1203.00	b	1244,00		1239,00		**1235,94**	22,37	1,81
15	**54**	P3.2	D31	1233,00		1245,00		1230,00		**1236,00**	7,94	0,64
16	**25**	P5.1	D31	1240,00		1240,00		1230,00		**1236,67**	5,77	0,47
17	**43**	P4.1	D31	1247,00		1151.00	b	1240,00		**1237,94**	53,52	4,32
18	**1**	P3.21	D21.1	1246,00		1255,00		1238,00		**1246,33**	8,50	0,68
19	**17**	P5.1	D31	1249,00		1262,00		1240,00		**1250,06**	11,06	0,88
20	**36**	P3.3	D21	1250,00		1245,00		1265,00		**1253,06**	10,41	0,83
21	**51**	P9.1	D42	1249,00		1251,00		1271.00	b	**1255,56**	12,17	0,97
22	**11**	P5.1	D31	1260,00		1260,00		1260,00		**1260,00**	0,00	0,00
23	**41**	P4.1	D31	1256,00		1268,00		1261,00		**1261,67**	6,03	0,48
24	**55a**	P9.1	D42	1255,00		1262,00		1273,00		**1263,33**	9,07	0,72
25	**44**	P4.1	D31	1270,00		1270,00		1250,00		**1264,44**	11,55	0,91
26	**46**	P5.2	D31	1226.00	b	1266,00		1276,00		**1265,44**	26,46	2,09
27	**5**	P3.3	D21	1270,00		1255,00		1275,00		**1266,94**	10,41	0,82
28	**47**	P4.1	D32	1268,00		1277,00		1278,00		**1274,33**	5,51	0,43
29	**4**	P5.1	D31	1280,40		1294,00		1236.40	b	**1280,40**	30,11	2,35
30	**38a**	P9.1	D42	1286,00		1282,00		1285,00		**1284,33**	2,08	0,16
31	**50**	P4.1	D31	1253.00	b	1288,00		1299,00		**1287,94**	24,02	1,86
32	**7**	P5.5	D31	1290,00		1300,00		1250.00	b	**1289,44**	26,46	2,05
33	**8**	P3.2	D31	1270.00	b	1300,00		1360.00	b	**1300,00**	45,83	3,53
34	**42**	P4.1	D31	1304,00		1301,00		1307,00		**1304,00**	3,00	0,23
35	**12**	P5.1	D31	1270.00	b	1307,00		1360.00	b	**1307,00**	45,24	3,46
36	**38**	P5.5	D31	1291.00	b	1313,00		1333.00	b	**1313,00**	21,01	1,60
37	**2**	P5.3	D31	1318,00		1321,00		1308,00		**1315,67**	6,81	0,52
38	**37**	P5.1	D31	1324,00		1310,00		1318,00		**1317,33**	7,02	0,53
39	**55**	P5.5	D31	1329,00		1324,00		1302.00	b	**1320,94**	14,36	1,09
40	**3**	P3.10	D31	1315,00		1335,00		1323,00		**1324,33**	10,07	0,76
41	**48**	P4.1	D31	1331,00		1335,00		1340,00		**1335,33**	4,51	0,34
42	**26**	P5.1	D31	1360,00		1370,00		1340.00	b	**1359,44**	15,28	1,12
43	**6**	P3.2	D31	1364,00		1360,00		1357,00		**1360,33**	3,51	0,26
44	**39**	P5.5	D31	1375,00		1378,00		1365,00		**1372,67**	6,81	0,50
45	**13**	P3.3	D21.1	1363,00		1374,00		1395.00	b	**1374,06**	16,26	1,18
46	**28**	P5.1	D21	1428.00	ab	1388.00	a	1387.00	a	**1393,06**	23,39	1,68
47	**37a**	P9.1	D42	1426.00	a	1410.00	a	1420.00	a	**1418,67**	8,08	0,57
48	**9**	P5.5	D31	1450.00	ab	1421.00	a	1406.00	ab	**1421,00**	22,37	1,57
49	**16**	P5.5	D31	1559.00	a	1531.00	ab	1549.00	a	**1548,44 ***	14,19	0,92
										Mean	Interlab.std. deviation	
											abs.	rel.%
										1271,00	**16,60**	**1,32**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **2,0**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Mn**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**4a**	P9.1	D41	830.00	a	835.00	a	839.00	a	**834,78**		4,51	0,54
2	**27**	P6.1	D21	936.00	ab	856.00	ab	883.00	a	**883,00**		40,70	4,61
3	**45**	P5.5	D31	895.00	a	899.00	a	893.00	a	**895,67**		3,06	0,34
4	**18**	P3.31	D31	880.00	ab	900.00	a	904.00	a	**899,78**		12,86	1,43
5	**14**	P4.1	D31	909,00		910,00		916,00		**911,67**		3,79	0,42
6	**40**	P3.11	D31	936,00		929,00		923,00		**929,00**		6,51	0,70
7	**33**	P5.1	D21	932,00		928,00		935,00		**931,67**		3,51	0,38
8	**10**	P5.1	D21.1	935,00		931,90		937,00		**934,63**		2,57	0,27
9	**29**	P3.3	D31	983.00	b	934,00		938,00		**938,22**		27,21	2,90
10	**36**	P3.3	D21	939,00		931,00		943,00		**938,78**		6,11	0,65
11	**17**	P5.1	D31	941,00		933,00		946,00		**941,00**		6,56	0,70
12	**24**	P5.1	D21	942,00		932.00	b	975.00	b	**942,00**		22,50	2,39
13	**1**	P3.21	D21.1	946,00		944,00		946,00		**945,33**		1,15	0,12
14	**25**	P5.1	D31	940,00		948,00		949,00		**946,28**		4,93	0,52
15	**43**	P4.1	D31	922.00	b	951,00		951,00		**948,78**		16,74	1,76
16	**54**	P3.2	D31	954,00		960,00		951,00		**954,72**		4,58	0,48
17	**52**	P4.1	D31	954,30		956,20		954,90		**955,13**		0,97	0,10
18	**50**	P4.1	D31	950,00		989.00	b	958,00		**958,00**		20,60	2,15
19	**47**	P4.1	D32	964,00		958,00		957,00		**959,67**		3,79	0,39
20	**20**	P5.1	D31	958,00		960,00		965,00		**961,00**		3,61	0,38
21	**12**	P5.1	D31	967,50		944.60	b	961,10		**961,10**		11,82	1,23
22	**7**	P5.5	D31	968,00		964,00		951.00	b	**963,78**		8,89	0,92
23	**41**	P4.1	D31	964,00		984.00	b	964,00		**966,22**		11,55	1,20
24	**44**	P4.1	D31	980.00	b	970,00		950.00	b	**970,00**		15,28	1,58
25	**4**	P5.1	D31	973,80		984.10	b	946.80	b	**973,80**		19,26	1,98
26	**55a**	P9.1	D42	975,00		972,00		981,00		**975,72**		4,58	0,47
27	**51**	P9.1	D42	973,00		976,00		989.00	b	**976,72**		8,50	0,87
28	**5**	P3.3	D21	985,00		975,00		985,00		**982,78**		5,77	0,59
29	**2**	P5.3	D31	972.00	b	983,00		988,00		**983,00**		8,19	0,83
30	**11**	P5.1	D31	984,00		983,00		982,00		**983,00**		1,00	0,10
31	**42**	P4.1	D31	986,00		985,00		973.00	b	**983,28**		7,23	0,74
32	**46**	P5.2	D31	968.40	b	988,40		988,70		**986,33**		11,63	1,18
33	**38a**	P9.1	D42	987,00		987,00		986,00		**986,67**		0,58	0,06
34	**23**	P3.3	D31	996,00		1009.00	b	959.00	b	**996,00**		25,94	2,60
35	**49**	P4.1	D31	1077.80	b	975.70	b	998,00		**998,00**		53,68	5,38
36	**55**	P5.5	D31	1005,00		1012,00		1004,00		**1006,72**		4,36	0,43
37	**8**	P3.2	D31	999.00	b	1010,00		1010,00		**1007,78**		6,35	0,63
38	**3**	P3.10	D31	998.00	b	1020.00	b	1009,00		**1009,00**		11,00	1,09
39	**26**	P5.1	D31	1020,00		1020,00		1000.00	b	**1017,78**		11,55	1,13
40	**37**	P5.1	D31	1017,00		1025,00		1022,00		**1021,33**		4,04	0,40
41	**13**	P3.3	D21.1	1029,00		1026,00		1028,00		**1027,67**		1,53	0,15
42	**6**	P3.2	D31	1024,00		1032,00		1034,00		**1030,78**		5,29	0,51
43	**48**	P4.1	D31	1022.00	b	1033,00		1045.00	b	**1033,00**		11,50	1,11
44	**39**	P5.5	D31	1038,00		1032,00		1032,00		**1034,00**		3,46	0,33
45	**38**	P5.5	D31	1060.00	b	1038,00		1012.00	b	**1038,00**		24,03	2,32
46	**9**	P5.5	D31	1042.00	ab	1072.00	ab	1054.00	a	**1054,00**		15,10	1,43
47	**28**	P5.1	D21	1030.00	ab	1055.00	a	1059.00	a	**1054,78**		15,72	1,49
48	**37a**	P9.1	D42	1110.00	a	1105.00	a	1109.00	a	**1108,00**		2,65	0,24
49	**16**	P5.5	D31	1176.00	a	1231.00	ab	1179.00	a	**1179,72**	*	30,92	2,62
										Mean		Interlab.std. deviation	
												abs.	rel.%
										975,80		**10,97**	**1,12**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **2,0**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**36**	P3.3	D21	75.80	a	76.40	a	75.60	a	**75,93**	*	0,42	0,55
2	**16**	P5.5	D31	82.50	ab	79.00	a	78.00	a	**79,17**	*	2,36	2,98
3	**14**	P4.1	D31	85,10		83,30		90.10	b	**85,10**	*	3,52	4,14
4	**7**	P5.5	D31	85,80		85,80		88,00		**86,47**	*	1,27	1,47
5	**2**	P5.3	D31	93,50		92,10		91,90		**92,50**		0,87	0,94
6	**4**	P5.1	D31	95,70		95,80		88.30	b	**95,08**		4,30	4,52
7	**40**	P3.11	D31	96,20		102.30	b	93.80	b	**96,20**		4,38	4,55
8	**33**	P5.1	D21	96,60		97,20		95,90		**96,57**		0,65	0,67
9	**10**	P5.1	D21.1	100,10		97,40		97,50		**98,12**		1,53	1,56
10	**20**	P5.1	D31	98,40		98,90		97,90		**98,40**		0,50	0,51
11	**52**	P4.1	D31	99,00		100,10		100,20		**99,77**		0,67	0,67
12	**44**	P4.1	D31	110.00	b	100,00		100,00		**100,67**		5,77	5,73
13	**9**	P5.5	D31	100,90		105.90	b	96.30	b	**100,90**		4,80	4,76
14	**11**	P5.1	D31	101,20		97.50	b	102,40		**101,13**		2,55	2,52
15	**18**	P3.31	D31	103.50	b	100,00		101,00		**101,17**		1,80	1,78
16	**51**	P9.1	D42	101,00		101,00		104.00	b	**101,67**		1,73	1,70
17	**27**	P6.1	D21	97.90	b	106.50	b	101,70		**101,70**		4,31	4,24
18	**47**	P4.1	D32	101,30		102,50		101,90		**101,90**		0,60	0,59
19	**17**	P5.1	D31	106.00	b	101,60		102,10		**102,52**		2,41	2,35
20	**42**	P4.1	D31	108.00	b	103,00		102,00		**103,17**		3,21	3,11
21	**28**	P5.1	D21	104,30		101,80		103,70		**103,33**		1,31	1,27
22	**50**	P4.1	D31	103,60		104,00		102,80		**103,47**		0,61	0,59
23	**45**	P5.5	D31	104,00		103,00		104,00		**103,67**		0,58	0,56
24	**12**	P5.1	D31	105,20		106,50		113.90	b	**106,52**		4,69	4,40
25	**55**	P5.5	D31	108,60		108,00		105,70		**107,63**		1,53	1,42
26	**41**	P4.1	D31	108,50		109,20		109,10		**108,93**		0,38	0,35
27	**3**	P3.10	D31	110,00		108,00		109,00		**109,00**		1,00	0,92
28	**43**	P4.1	D31	110,30		108,80		109,80		**109,63**		0,76	0,69
29	**25**	P5.1	D31	107.00	b	110,00		118.00	b	**110,00**		5,69	5,17
30	**48**	P4.1	D31	110,40		109,10		110,60		**110,03**		0,81	0,74
31	**39**	P5.5	D31	111,90		110,20		107.60	b	**110,20**		2,17	1,97
32	**49**	P4.1	D31	113,00		114,10		111,10		**112,88**		1,52	1,35
33	**26**	P5.1	D31	113,00		110.00	b	117.00	b	**113,00**		3,51	3,11
34	**37**	P5.1	D31	115,10		114,20		113,80		**114,37**		0,67	0,59
35	**37a**	P9.1	D42	113,60		115,40		116,30		**115,18**		1,37	1,19
36	**38**	P5.5	D31	118,20		114.00	b	121.70	b	**118,20**		3,86	3,27
37	**29**	P3.3	D31	118,70		116,70		119,60		**118,48**		1,48	1,25
38	**23**	P3.3	D31	130,60		122.00	b	145.60	b	**130,60**	*	11,94	9,14
39	**24**	P5.1	D21	133,40		131,90		129.10	b	**131,90**	*	2,18	1,65
40	**5**	P3.3	D21	140.00	ab	135.00	a	136.50	a	**136,50**	*	2,57	1,88
41	**8**	P3.2	D31	177.00	a	178.00	a	172.00	ab	**176,83**	*	3,21	1,82
42	**6**	P3.2	D31	185.20	ab	179.70	a	172.80	ab	**179,70**	*	6,21	3,46
43	**38a**	P9.1	D42	179.90	a	179.30	a	181.00	a	**180,07**	*	0,86	0,48
44	**54**	P3.2	D31	180.10	a	176.90	ab	184.00	ab	**180,10**	*	3,56	1,98
45	**55a**	P9.1	D42	183.70	a	183.60	a	184.80	a	**184,03**	*	0,67	0,36
46	**46**	P5.2	D31	188.50	a	185.20	ab	189.50	a	**188,33**	*	2,25	1,19
47	**4a**	P9.1	D41	211.00	ab	196.00	ab	205.00	a	**205,00**	*	7,55	3,68

Mean	Interlab.std. deviation	
	abs.	rel.%
108,20	**2,57**	**2,21**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **29,8**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Fe**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**16**	P5.5	D31	44.40	a	43.50	a	43.10	a	**43,67**	*	0,67	1,53
2	**36**	P3.3	D21	46.10	a	43.90	ab	47.30	a	**46,10**	*	1,72	3,73
3	**51**	P9.1	D42	46.00	a	47.00	a	47.00	a	**46,67**	*	0,58	1,24
4	**54**	P3.2	D31	55,60		54,90		55,30		**55,27**		0,35	0,63
5	**7**	P5.5	D31	56,90		54.70	b	57,90		**56,84**		1,64	2,89
6	**14**	P4.1	D31	57,40		58,80		59,00		**58,40**		0,87	1,49
7	**27**	P6.1	D21	59,40		58,30		61.80	b	**59,41**		1,79	3,01
8	**52**	P4.1	D31	60,10		60,30		60,80		**60,40**		0,36	0,60
9	**2**	P5.3	D31	57.70	b	63.30	b	60,50		**60,50**		2,80	4,63
10	**9**	P5.5	D31	60,70		67.90	b	62,30		**62,30**		3,78	6,07
11	**40**	P3.11	D31	63,10		65,00		62,80		**63,51**		1,19	1,87
12	**4**	P5.1	D31	66.90	b	63,20		63,70		**64,01**		2,01	3,14
13	**38a**	P9.1	D42	63,60		64,70		64,40		**64,23**		0,57	0,89
14	**42**	P4.1	D31	67,00		64,00		65,00		**65,06**		1,53	2,35
15	**11**	P5.1	D31	66,10		64,90		65,90		**65,63**		0,64	0,98
16	**20**	P5.1	D31	63,90		65,80		66,70		**65,69**		1,43	2,18
17	**28**	P5.1	D21	72.80	b	60.00	b	65,90		**65,90**		6,41	9,73
18	**46**	P5.2	D31	66,90		68,70		65,50		**66,90**		1,60	2,39
19	**12**	P5.1	D31	66,20		68,90		66,70		**67,01**		1,44	2,15
20	**6**	P3.2	D31	67,50		62.00	b	67,80		**67,09**		3,27	4,87
21	**17**	P5.1	D31	67,30		67,00		67,70		**67,33**		0,35	0,52
22	**45**	P5.5	D31	67,00		68,00		67,00		**67,33**		0,58	0,86
23	**25**	P5.1	D31	66.40	b	68,70		69,20		**68,39**		1,49	2,18
24	**50**	P4.1	D31	69,20		68,00		70,70		**69,20**		1,35	1,95
25	**44**	P4.1	D31	70,00		70,00		70,00		**70,00**		0,00	0,00
26	**8**	P3.2	D31	70,10		67.20	b	78.90	b	**70,10**		6,09	8,69
27	**26**	P5.1	D31	70,20		68.10	b	71,30		**70,19**		1,63	2,32
28	**48**	P4.1	D31	70,30		71,10		70,10		**70,50**		0,53	0,75
29	**33**	P5.1	D21	69,20		70,70		72,30		**70,70**		1,55	2,19
30	**29**	P3.3	D31	69,70		72,50		70,90		**70,90**		1,40	1,97
31	**55**	P5.5	D31	71,10		71,60		71,40		**71,37**		0,25	0,35
32	**39**	P5.5	D31	71,50		74.20	b	68.40	b	**71,50**		2,90	4,06
33	**3**	P3.10	D31	81.00	b	72,00		69.00	b	**72,00**		6,24	8,67
34	**41**	P4.1	D31	72,50		85.80	b	71,40		**72,51**		8,02	11,06
35	**49**	P4.1	D31	74,10		73,20		70.30	b	**73,09**		1,99	2,72
36	**10**	P5.1	D21.1	73,10		68.70	b	74,60		**73,10**		3,07	4,20
37	**24**	P5.1	D21	72,50		73,20		74,90		**73,41**		1,23	1,68
38	**43**	P4.1	D31	75.00	b	78,40		83.50	b	**78,40**		4,28	5,46
39	**47**	P4.1	D32	78,70		80,20		72.70	b	**78,70**		3,97	5,04
40	**38**	P5.5	D31	85.50	b	77.00	b	80,00		**80,00**		4,31	5,39
41	**55a**	P9.1	D42	82,20		81,50		81,40		**81,70**		0,44	0,54
42	**23**	P3.3	D31	83.90	a	83.90	a	79.30	ab	**83,34**	*	2,66	3,19
43	**37**	P5.1	D31	85.30	a	84.10	a	86.80	a	**85,30**	*	1,35	1,58
44	**37a**	P9.1	D42	86.40	a	84.90	a	85.60	a	**85,63**	*	0,75	0,88
45	**4a**	P9.1	D41	91.00	a	83.00	ab	90.00	a	**89,94**	*	4,36	4,85
46	**5**	P3.3	D21	94.50	ab	87.00	ab	90.00	a	**90,00**	*	3,77	4,19
47	**18**	P3.31	D31	101.60	a	68.40	ab	137.00	ab	**101,60**	*	34,31	33,77

Mean	Interlab.std. deviation	
	abs.	rel.%
68,93	**2,84**	**3,73**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **19,1**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **69,38**

ICP-Forests 5th needle/leaf labtest 01/02

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	**36**	P3.3	D21	76.80	a	78.10	a	80.90	ab	**78,12**	*	2,10	2,69
2	**51**	P9.1	D42	79.70	a	81.20	a	81.80	a	**80,90**	*	1,08	1,33
3	**28**	P5.1	D21	88.00	ab	82.60	a	78.90	ab	**82,60**	*	4,58	5,54
4	**7**	P5.5	D31	88.60	ab	82.30	a	82.80	a	**83,22**	*	3,50	4,21
5	**16**	P5.5	D31	80.90	ab	83.80	a	94.60	ab	**83,80**	*	7,22	8,62
6	**27**	P6.1	D21	89.10	a	88.60	a	96.00	ab	**89,52**		4,14	4,62
7	**54**	P3.2	D31	94,60		91.60	b	96,60		**94,60**		2,52	2,66
8	**14**	P4.1	D31	93,90		94,40		96,20		**94,82**		1,21	1,28
9	**29**	P3.3	D31	95,70		93,90		98.60	b	**95,70**		2,37	2,48
10	**4**	P5.1	D31	100,50		101,60		98,40		**100,38**		1,63	1,62
11	**2**	P5.3	D31	101,60		100,60		98,30		**100,43**		1,69	1,68
12	**11**	P5.1	D31	101,30		102,80		102,50		**102,20**		0,79	0,77
13	**9**	P5.5	D31	102,80		102,40		107.20	b	**103,27**		2,66	2,58
14	**52**	P4.1	D31	104,20		103,50		103,00		**103,57**		0,60	0,58
15	**20**	P5.1	D31	105,00		104,50		103,90		**104,47**		0,55	0,53
16	**40**	P3.11	D31	105,90		102.80	b	107,10		**105,83**		2,22	2,10
17	**6**	P3.2	D31	106,20		107,60		107,20		**107,00**		0,72	0,67
18	**46**	P5.2	D31	106,90		106,40		112.20	b	**107,32**		3,21	2,99
19	**18**	P3.31	D31	108,80		108,60		103.50	b	**108,03**		3,00	2,78
20	**45**	P5.5	D31	108,00		108,00		111,00		**108,67**		1,73	1,59
21	**10**	P5.1	D21.1	113.00	b	108,20		108,10		**108,82**		2,80	2,57
22	**44**	P4.1	D31	110,00		110,00		110,00		**110,00**		0,00	0,00
23	**47**	P4.1	D32	108,20		110,90		111,50		**110,53**		1,76	1,59
24	**42**	P4.1	D31	111,00		110,00		111,00		**110,67**		0,58	0,52
25	**33**	P5.1	D21	110,80		106.20	b	115.40	b	**110,80**		4,60	4,15
26	**17**	P5.1	D31	111,50		113,70		108,90		**111,50**		2,40	2,15
27	**8**	P3.2	D31	98.70	b	113,00		115,00		**113,00**		8,89	7,87
28	**25**	P5.1	D31	111,00		113,00		115,00		**113,00**		2,00	1,77
29	**41**	P4.1	D31	111,40		113,30		119.10	b	**113,30**		4,01	3,54
30	**50**	P4.1	D31	111,50		113,30		115,70		**113,30**		2,11	1,86
31	**55**	P5.5	D31	114,40		115,00		111.30	b	**114,03**		1,99	1,75
32	**3**	P3.10	D31	114,00		127.00	b	115,00		**115,17**		7,23	6,28
33	**24**	P5.1	D21	117,50		114,30		115,10		**115,37**		1,67	1,45
34	**43**	P4.1	D31	117,20		101.80	b	116,60		**116,23**		8,72	7,50
35	**48**	P4.1	D31	115,60		117,60		117,00		**116,73**		1,03	0,88
36	**37**	P5.1	D31	118,60		116,10		117,20		**117,30**		1,25	1,07
37	**26**	P5.1	D31	118,00		115.00	b	120,00		**118,00**		2,52	2,14
38	**12**	P5.1	D31	114.20	b	118,40		124.30	b	**118,40**		5,07	4,28
39	**49**	P4.1	D31	117,40		123.90	b	119,10		**119,10**		3,37	2,83
40	**37a**	P9.1	D42	119,90		120,80		117,70		**119,68**		1,59	1,33
41	**38a**	P9.1	D42	122,30		121,40		122,30		**122,00**		0,52	0,43
42	**55a**	P9.1	D42	122,10		123,90		122,70		**122,90**		0,92	0,75
43	**39**	P5.5	D31	124,00		123,20		123,00		**123,40**		0,53	0,43
44	**23**	P3.3	D31	119.70	b	143.50	b	125,60		**125,60**		12,39	9,86
45	**38**	P5.5	D31	122.30	b	129,70		127,60		**127,60**		3,81	2,99
46	**4a**	P9.1	D41	147.00	a	142.00	ab	151.00	ab	**147,00**	*	4,51	3,07
47	**5**	P3.3	D21	147.50	a	151.50	ab	148.00	a	**148,42**	*	2,18	1,47

Mean	Interlab.std. deviation	
	abs.	rel.%
109,60	**2,89**	**2,68**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **14,9**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Fe**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**43**	P4.1	D31	64.30	a	66.00	a	66.90	a	**65,73**	*	1,32	2,01
2	**36**	P3.3	D21	98.40	a	98.10	a	98.20	a	**98,23**	*	0,15	0,15
3	**7**	P5.5	D31	110.00	ab	118.00	ab	115.00	a	**115,00**		4,04	3,51
4	**27**	P6.1	D21	115.30	a	115.00	a	115.00	a	**115,10**		0,17	0,15
5	**28**	P5.1	D21	122.20	ab	117.40	a	105.20	ab	**117,40**		8,76	7,46
6	**16**	P5.5	D31	118.00	a	115.00	ab	121.00	ab	**118,00**		3,00	2,54
7	**4**	P5.1	D31	131,60		129,50		128,80		**129,93**		1,46	1,12
8	**2**	P5.3	D31	134.70	b	127.00	b	130,00		**130,00**		3,88	2,98
9	**20**	P5.1	D31	131,70		130,20		130,40		**130,77**		0,81	0,62
10	**29**	P3.3	D31	129,70		135.60	b	130,80		**131,03**		3,14	2,40
11	**14**	P4.1	D31	130,30		131,70		132,80		**131,60**		1,25	0,95
12	**54**	P3.2	D31	134,00		130,60		131,90		**132,03**		1,72	1,30
13	**18**	P3.31	D31	135,80		136,10		141.80	b	**136,73**		3,38	2,47
14	**9**	P5.5	D31	123.40	b	137,50		140.50	b	**137,50**		9,13	6,64
15	**11**	P5.1	D31	138,20		137,70		137,60		**137,83**		0,32	0,23
16	**33**	P5.1	D21	134.60	b	138,20		141.80	b	**138,20**		3,60	2,60
17	**8**	P3.2	D31	143.00	b	138,00		139,00		**139,28**		2,65	1,90
18	**6**	P3.2	D31	137.20	b	146.20	b	140,10		**140,10**		4,59	3,28
19	**51**	P9.1	D42	138,00		141,00		141,00		**140,22**		1,73	1,23
20	**10**	P5.1	D21.1	141,90		140,20		141,40		**141,17**		0,87	0,62
21	**46**	P5.2	D31	139,60		141,50		143,60		**141,50**		2,00	1,41
22	**40**	P3.11	D31	142,10		143,50		145,10		**143,57**		1,50	1,04
23	**26**	P5.1	D31	146.50	b	143,00		142,70		**143,63**		2,11	1,47
24	**17**	P5.1	D31	144,30		145,10		141,90		**143,92**		1,67	1,16
25	**52**	P4.1	D31	145,20		144,80		144,80		**144,93**		0,23	0,16
26	**45**	P5.5	D31	144,00		146,00		145,00		**145,00**		1,00	0,69
27	**50**	P4.1	D31	144,80		148.10	b	144,10		**145,23**		2,14	1,47
28	**42**	P4.1	D31	146,00		148,00		143.00	b	**146,00**		2,52	1,73
29	**12**	P5.1	D31	152.90	b	145,30		147,00		**147,00**		3,99	2,71
30	**47**	P4.1	D32	147,70		149,10		144.20	b	**147,62**		2,52	1,71
31	**44**	P4.1	D31	150,00		150,00		140.00	b	**149,22**		5,77	3,87
32	**25**	P5.1	D31	148,00		152.00	b	149,00		**149,28**		2,08	1,39
33	**3**	P3.10	D31	151,00		152,00		152,00		**151,67**		0,58	0,38
34	**41**	P4.1	D31	152,20		155.80	b	147.70	b	**152,20**		4,06	2,67
35	**24**	P5.1	D21	153,80		153,20		152,50		**153,17**		0,65	0,42
36	**39**	P5.5	D31	154,40		150.10	b	154,70		**153,77**		2,57	1,67
37	**55**	P5.5	D31	149.60	b	155,50		153,90		**153,90**		3,05	1,98
38	**55a**	P9.1	D42	153,20		155,00		153,80		**154,00**		0,92	0,60
39	**38a**	P9.1	D42	154,10		154,20		154,40		**154,23**		0,15	0,10
40	**48**	P4.1	D31	154,50		156,70		151.30	b	**154,50**		2,72	1,76
41	**37**	P5.1	D31	156,80		154,50		156,10		**155,80**		1,18	0,76
42	**37a**	P9.1	D42	160,90		157.30	b	162,20		**160,77**		2,54	1,58
43	**38**	P5.5	D31	168.70	a	167.70	a	163.40	ab	**167,42**		2,82	1,68
44	**49**	P4.1	D31	177.50	a	179.60	a	178.70	a	**178,60**	*	1,05	0,59
45	**5**	P3.3	D21	199.00	ab	179.00	a	168.00	ab	**179,00**	*	15,72	8,78
46	**23**	P3.3	D31	246.00	ab	176.70	ab	184.10	a	**184,10**	*	38,05	20,67
47	**4a**	P9.1	D41	186.00	a	180.00	ab	189.00	ab	**186,00**	*	4,58	2,46

Mean	Interlab.std. deviation	
	abs.	rel.%
143,50	**3,49**	**2,32**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **12,8**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**5**	P3.3	D21	3.50	ab	3.00	a	3.00	a	**3,04**	*	0,29	9,54
2	**49**	P4.1	D31	3.14	a	2.33	ab	3.78	ab	**3,14**		0,73	23,25
3	**9**	P5.5	D31	3.54	a	3.33	a	3.38	a	**3,40**		0,11	3,24
4	**14**	P4.1	D31	3.48	a	3.27	ab	3.84	ab	**3,48**		0,29	8,33
5	**42**	P4.1	D31	3.70	a	3.70	a	3.50	ab	**3,66**		0,12	3,28
6	**54**	P3.2	D31	3.66	a	3.90	ab	3.58	a	**3,66**		0,17	4,64
7	**24**	P5.1	D21	3,72		3,88		3,76		**3,78**		0,08	2,12
8	**29**	P3.3	D31	4,12		3,95		3,94		**3,99**		0,10	2,51
9	**18**	P3.31	D31	4,02		4.40	b	3,90		**4,02**		0,26	6,47
10	**27**	P6.1	D21	4.28	b	4,01		4,01		**4,05**		0,16	3,95
11	**11**	P5.1	D22	4,10		4,09		4,17		**4,12**		0,04	0,97
12	**16**	P5.5	D31	4,29		4,06		4,15		**4,15**		0,12	2,89
13	**17**	P5.1	D32	4,17		4,15		4,15		**4,16**		0,01	0,24
14	**6**	P3.2	D31	4,29		4,08		4,19		**4,19**		0,11	2,63
15	**38a**	P9.1	D42	4,10		4,20		4,30		**4,20**		0,10	2,38
16	**55**	P5.5	D22	4,21		4,32		3.94	b	**4,21**		0,20	4,75
17	**40**	P3.11	D31	4,17		4,36		4,27		**4,27**		0,10	2,34
18	**2**	P5.3	D31	4.10	b	4.50	b	4,30		**4,30**		0,20	4,65
19	**12**	P5.1	D31	6.73	b	4,37		4.07	b	**4,37**		1,46	33,41
20	**48**	P4.1	D31	4,30		4,37		4,52		**4,38**		0,11	2,51
21	**7**	P5.5	D31	4.26	b	4,48		4,43		**4,41**		0,12	2,72
22	**20**	P5.1	D31	5.07	b	4,42		4,38		**4,44**		0,39	8,78
23	**44**	P4.1	D32	4.84	b	4,43		4,51		**4,51**		0,22	4,88
24	**8**	P3.2	D31	4,48		4,53		4,56		**4,52**		0,04	0,88
25	**41**	P4.1	D31	4.36	b	4,56		6.29	b	**4,56**		1,06	23,25
26	**26**	P5.1	D31	4.83	b	4,57		4,49		**4,57**		0,18	3,94
27	**37**	P5.1	D31	4,55		4,57		4,61		**4,58**		0,03	0,66
28	**45**	P5.5	D31	4,60		4,60		4,60		**4,60**		0,00	0,00
29	**50**	P4.1	D31	4,61		4,69		4.14	b	**4,61**		0,30	6,51
30	**23**	P3.3	D31	4,57		4,65		5.72	b	**4,65**		0,64	13,76
31	**33**	P5.1	D21	4.99	b	4,59		4,65		**4,66**		0,22	4,72
32	**46**	P5.2	D31	4,66		4.39	b	4.94	b	**4,66**		0,28	6,01
33	**38**	P5.5	D31	4,60		4,73		4,69		**4,67**		0,07	1,50
34	**4a**	P9.1	D41	4,70		4,70		4,70		**4,70**		0,00	0,00
35	**39**	P5.5	D35	4,81		4,70		4.46	b	**4,70**		0,18	3,83
36	**52**	P4.1	D31	4,72		4,70		4,69		**4,70**		0,02	0,43
37	**37a**	P9.1	D42	4,75		4,80		4,75		**4,77**		0,03	0,63
38	**47**	P4.1	D32	4,84		4,82		5.02	b	**4,87**		0,11	2,26
39	**4**	P.51	D22	4,99		4,88		4,81		**4,89**		0,09	1,84
40	**28**	P5.1	D21	5,11		5,06		4,98		**5,05**		0,07	1,39
41	**36**	P3.3	D21	5.31	a	5.32	a	5.36	a	**5,33**		0,03	0,56
42	**13**	P3.3	D21.1	5.86	a	6.20	ab	5.80	a	**5,87**	*	0,22	3,75
43	**55a**	P9.1	D42	6.00	a	5.90	a	5.70	ab	**5,90**	*	0,15	2,54
44	**10**	P5.1	D21.1	9.40	a	9.30	a	9.30	a	**9,33**	*	0,06	0,64

Mean	Interlab.std. deviation	
	abs.	rel.%
4,41	**0,21**	**4,99**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **9,1**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Cu**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**54**	P3.2	D31	2.34	a	2.55	ab	2.30	a	**2,34**	*	0,13	5,56
2	**9**	P5.5	D31	2.53	a	2.52	a	2.43	a	**2,50**		0,06	2,40
3	**14**	P4.1	D31	2.59	a	2.74	ab	2.20	ab	**2,59**		0,28	10,81
4	**29**	P3.3	D31	3.03	b	2,71		2,69		**2,72**		0,19	6,99
5	**42**	P4.1	D31	2,70		2,80		2,80		**2,78**		0,06	2,16
6	**33**	P5.1	D21	2,84		2,90		2,75		**2,84**		0,08	2,82
7	**55a**	P9.1	D42	2,80		3,00		2,90		**2,90**		0,10	3,45
8	**12**	P5.1	D31	2.35	b	2,95		4.82	b	**2,95**		1,29	43,73
9	**11**	P5.1	D22	3,02		3,04		3,04		**3,03**		0,01	0,33
10	**8**	P3.2	D31	3,09		3,14		3,16		**3,13**		0,04	1,28
11	**49**	P4.1	D31	3.40	b	3,15		2.81	b	**3,15**		0,30	9,52
12	**55**	P5.5	D22	3,20		3,22		3.04	b	**3,19**		0,10	3,13
13	**16**	P5.5	D31	3,19		3,19		3,23		**3,20**		0,02	0,63
14	**45**	P5.5	D31	3,20		3,30		3,20		**3,22**		0,06	1,86
15	**44**	P4.1	D32	3,22		3.41	b	3,21		**3,24**		0,11	3,40
16	**40**	P3.11	D31	3,24		3,36		3,22		**3,25**		0,08	2,46
17	**48**	P4.1	D31	3,26		3,28		3,31		**3,28**		0,03	0,91
18	**50**	P4.1	D31	3,35		3,28		3,26		**3,29**		0,05	1,52
19	**2**	P5.3	D31	3,30		3,40		3,20		**3,30**		0,10	3,03
20	**17**	P5.1	D32	3,30		3,28		3,39		**3,31**		0,06	1,81
21	**26**	P5.1	D31	3.48	b	3,30		3,28		**3,31**		0,11	3,32
22	**18**	P3.31	D31	2.53	b	3,37		4.00	b	**3,37**		0,74	21,96
23	**52**	P4.1	D31	3,40		3,49		3,50		**3,47**		0,06	1,73
24	**27**	P6.1	D21	3.75	b	3,48		3.28	b	**3,48**		0,24	6,90
25	**46**	P5.2	D31	3,51		3,58		3,47		**3,51**		0,06	1,71
26	**7**	P5.5	D31	3.39	b	3,52		3,59		**3,52**		0,10	2,84
27	**39**	P5.5	D35	3,56		3,53		3,55		**3,55**		0,02	0,56
28	**38a**	P9.1	D42	3,60		3,60		3,50		**3,58**		0,06	1,68
29	**47**	P4.1	D32	3,54		3,58		3,63		**3,58**		0,05	1,40
30	**4**	P.51	D22	3.75	b	3.38	b	3,60		**3,60**		0,19	5,28
31	**23**	P3.3	D31	3.47	b	3.74	b	3,60		**3,60**		0,14	3,89
32	**37**	P5.1	D31	3,71		3,64		3,62		**3,65**		0,05	1,37
33	**38**	P5.5	D31	3,70		3.46	b	3,72		**3,69**		0,14	3,79
34	**37a**	P9.1	D42	3,80		3,70		3,80		**3,78**		0,06	1,59
35	**28**	P5.1	D21	3,78		3.99	b	3,78		**3,80**		0,12	3,16
36	**4a**	P9.1	D41	3,90		3,80		4.30	b	**3,90**		0,26	6,67
37	**20**	P5.1	D31	3.61	b	3,99		4,09		**3,99**		0,25	6,27
38	**41**	P4.1	D31	3,98		5.03	b	3,98		**4,00**		0,61	15,25
39	**5**	P3.3	D21	4,00		4.50	b	4,00		**4,02**		0,29	7,21
40	**24**	P5.1	D21	4.61	a	4.70	a	4.52	a	**4,61**	*	0,09	1,95
41	**36**	P3.3	D21	4.77	a	4.24	ab	4.85	a	**4,77**	*	0,33	6,92
42	**10**	P5.1	D21.1	7.80	ab	6.00	ab	6.80	a	**6,80**	*	0,90	13,24
43	**13**	P3.3	D21.1	7.73	ab	5.71	ab	7.38	a	**7,38**	*	1,08	14,63

	Mean	Interlab.std. deviation	
		abs.	rel.%
	3,41	**0,21**	**5,61**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **11,6**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **3,52**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**54**	P3.2	D31	1.95	a	1.99	a	1.90	a	**1,95**	*	0,05	2,56
2	**14**	P4.1	D31	1.94	a	2.02	a	2.10	a	**2,02**	*	0,08	3,96
3	**9**	P5.5	D31	2.11	a	2.21	a	2.18	a	**2,17**		0,05	2,30
4	**42**	P4.1	D31	2,50		2,40		2,50		**2,47**		0,06	2,43
5	**7**	P5.5	D31	2,53		2,40		2,51		**2,49**		0,07	2,81
6	**2**	P5.3	D31	2,50		2,50		2,50		**2,50**		0,00	0,00
7	**29**	P3.3	D31	2,68		2,57		2,71		**2,66**		0,07	2,63
8	**11**	P5.1	D22	2,70		2,62		2,69		**2,67**		0,04	1,50
9	**8**	P3.2	D31	2,74		2,72		2.89	b	**2,76**		0,09	3,26
10	**16**	P5.5	D31	2,71		2,83				**2,77**		0,08	2,89
11	**26**	P5.1	D31	2,81		2,76		2,75		**2,77**		0,03	1,08
12	**39**	P5.5	D35	2,83		2,73		2,75		**2,77**		0,05	1,81
13	**48**	P4.1	D31	2,80		2,81		2,86		**2,82**		0,03	1,06
14	**55**	P5.5	D22	2,82		2.70	b	3.02	b	**2,82**		0,16	5,67
15	**17**	P5.1	D32	2,90		2,85		2,87		**2,87**		0,03	1,05
16	**40**	P3.11	D31	2,87		2,91		2,84		**2,87**		0,04	1,39
17	**49**	P4.1	D31	2.98	b	2,87		2.58	b	**2,87**		0,21	7,32
18	**45**	P5.5	D31	2,80		2,90		3.10	b	**2,90**		0,15	5,17
19	**44**	P4.1	D32	2,97		2,87		2,89		**2,91**		0,05	1,72
20	**27**	P6.1	D21	2.68	b	2,94		3.48	b	**2,94**		0,41	13,95
21	**50**	P4.1	D31	3,07		2,89		2,98		**2,98**		0,09	3,02
22	**37a**	P9.1	D42	2,95		3,02		3,10		**3,02**		0,08	2,65
23	**18**	P3.31	D31	3.22	b	3,10		2.55	b	**3,10**		0,36	11,61
24	**24**	P5.1	D21	3.36	b	3,04		3,12		**3,12**		0,17	5,45
25	**37**	P5.1	D31	3,12		3,18		3,07		**3,12**		0,06	1,92
26	**23**	P3.3	D31	2.82	b	3,15		3.38	b	**3,15**		0,28	8,89
27	**46**	P5.2	D31	2.97	b	3.80	b	3,15		**3,15**		0,44	13,97
28	**47**	P4.1	D32	3,19		3,12		3,21		**3,17**		0,05	1,58
29	**4**	P.51	D22	3,15		3,24		3,18		**3,19**		0,05	1,57
30	**33**	P5.1	D21	3,20		3,14		3,22		**3,19**		0,04	1,25
31	**4a**	P9.1	D41	3,20		3,10		3.40	b	**3,20**		0,15	4,69
32	**20**	P5.1	D31	3.64	b	3,22		2.99	b	**3,22**		0,33	10,25
33	**28**	P5.1	D21	3,27		3,14		3,24		**3,22**		0,07	2,17
34	**52**	P4.1	D31	3,25		3,30		3,28		**3,28**		0,03	0,91
35	**38a**	P9.1	D42	3,30		3,30		3,30		**3,30**		0,00	0,00
36	**38**	P5.5	D31	3.45	b	3.15	b	3,32		**3,32**		0,15	4,52
37	**41**	P4.1	D31	3.17	b	3,37		3.69	b	**3,37**		0,26	7,72
38	**5**	P3.3	D21	3,50		3,50		3,50		**3,50**		0,00	0,00
39	**55a**	P9.1	D42	3.60	a	3.60	a	3.70	a	**3,63**		0,06	1,65
40	**13**	P3.3	D21.1	3.85	a	4.73	ab	3.86	a	**3,89**		0,51	13,11
41	**12**	P5.1	D31	4.58	a	2.67	ab	5.55	ab	**4,58**	*	1,47	32,10
42	**36**	P3.3	D21	4.73	a	4.80	a	4.67	a	**4,73**	*	0,07	1,48
43	**10**	P5.1	D21.1	6.10	ab	5.70	a	4.90	ab	**5,70**	*	0,61	10,70

Mean	Interlab.std. deviation	
	abs.	rel.%
3,02	**0,16**	**4,79**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **11,6**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Cu**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**54**	P3.2	D31	3.16	a	3.09	a	3.14	a	**3,13**		0,04	1,28
2	**46**	P5.2	D31	3.06	a	3.27	ab	3.15	a	**3,15**		0,11	3,49
3	**9**	P5.5	D31	3.38	a	3.39	a	3.42	a	**3,40**		0,02	0,59
4	**42**	P4.1	D31	3.50	a	3.50	a	3.40	a	**3,48**		0,06	1,72
5	**27**	P6.1	D21	3,75		3,75		3,75		**3,75**		0,00	0,00
6	**29**	P3.3	D31	3,76		3.88	b	3.65	b	**3,76**		0,12	3,19
7	**11**	P5.1	D22	3,81		3,81		3,80		**3,81**		0,01	0,26
8	**7**	P5.5	D31	3,92		3,85		3,77		**3,85**		0,08	2,08
9	**6**	P3.2	D31	3,81		4.06	b	3,86		**3,86**		0,13	3,37
10	**2**	P5.3	D31	3.70	b	3,90		3,90		**3,88**		0,12	3,09
11	**55**	P5.5	D22	4.10	b	3,88		3,88		**3,90**		0,13	3,33
12	**14**	P4.1	D31	3,89		3,90		4.22	b	**3,92**		0,19	4,85
13	**18**	P3.31	D31	3,99		4.54	b	3.76	b	**3,99**		0,40	10,03
14	**50**	P4.1	D31	4,01		4,00		3,96		**3,99**		0,03	0,75
15	**26**	P5.1	D31	4,04		4,08		3,98		**4,04**		0,05	1,24
16	**40**	P3.11	D31	4,03		4,08		4,06		**4,06**		0,03	0,74
17	**16**	P5.5	D31	3.94	b	4,11		4,07		**4,07**		0,09	2,21
18	**17**	P5.1	D32	4,11		4.26	b	4,02		**4,11**		0,12	2,92
19	**45**	P5.5	D31	4.00	b	4,20		4,20		**4,18**		0,12	2,87
20	**8**	P3.2	D31	4,19		4.34	b	4,15		**4,19**		0,10	2,39
21	**37a**	P9.1	D42	4,25		4,20		4,20		**4,22**		0,03	0,71
22	**39**	P5.5	D35	4,22		4,19		4,28		**4,23**		0,05	1,18
23	**48**	P4.1	D31	4,33		4,31		4,39		**4,34**		0,04	0,92
24	**52**	P4.1	D31	4,39		4,42		4,40		**4,40**		0,02	0,45
25	**44**	P4.1	D32	4,42		4.53	b	4.16	b	**4,42**		0,19	4,30
26	**33**	P5.1	D21	4,52		4.14	b	4,43		**4,43**		0,20	4,51
27	**13**	P3.3	D21.1	4.59	b	4,44		3.29	b	**4,44**		0,71	15,99
28	**12**	P5.1	D31	4,47		3.07	b	5.55	b	**4,47**		1,24	27,74
29	**37**	P5.1	D31	4,45		4,48		4,47		**4,47**		0,02	0,45
30	**4a**	P9.1	D41	4.00	b	4.80	b	4,50		**4,50**		0,40	8,89
31	**41**	P4.1	D31	4,53		5.11	b	4,49		**4,53**		0,35	7,73
32	**47**	P4.1	D32	4,52		4,52		4,55		**4,53**		0,02	0,44
33	**4**	P.51	D22	4,61		4,51		4,52		**4,54**		0,06	1,32
34	**38**	P5.5	D31	4,58		4,65		4,53		**4,58**		0,06	1,31
35	**38a**	P9.1	D42	4,70		4,60		4,60		**4,62**		0,06	1,30
36	**20**	P5.1	D31	4,70		4,73		4.59	b	**4,69**		0,07	1,49
37	**55a**	P9.1	D42	4.80	b	4.60	b	4,70		**4,70**		0,10	2,13
38	**28**	P5.1	D21	4,70		5.01	b	4,77		**4,77**		0,16	3,35
39	**23**	P3.3	D31	4,92		4.74	b	5.08	b	**4,92**		0,17	3,46
40	**49**	P4.1	D31	5,03		5,00		4.68	b	**4,99**		0,19	3,81
41	**5**	P3.3	D21	5,00		5,00		5,00		**5,00**		0,00	0,00
42	**36**	P3.3	D21	5.98	a	5.93	a	6.11	ab	**5,98**	*	0,09	1,51
43	**24**	P5.1	D21	6.53	a	6.64	ab	6.45	a	**6,53**	*	0,10	1,53
44	**10**	P5.1	D21.1	7.40	ab	7.10	ab	7.30	a	**7,30**	*	0,15	2,05

Mean	Interlab.std. deviation	
	abs.	rel.%
4,28	**0,15**	**3,34**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,8**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**55a**	P9.1	D42	1.70	ab	1.20	ab	1.40	a	**1,40**	*	0,25	17,86
2	**46**	P5.2	D32	1.50	a	1.60	a	1.60	a	**1,58**	*	0,06	3,80
3	**18**	P6.4	D31	1,80		2.40	b	1.60	b	**1,80**		0,42	23,33
4	**20**	P5.1	D22	1,90		1,70		1,80		**1,80**		0,10	5,56
5	**2**	P5.3	D31	1.70	b	2,00		1,90		**1,90**		0,15	7,89
6	**11**	P5.1	D22	2,00		2,00		2,00		**2,00**		0,00	0,00
7	**25**	P5.1	D22	2,10		2,00		1,90		**2,00**		0,10	5,00
8	**8**	P3.2	D41	2,20		2,00		2,10		**2,10**		0,10	4,76
9	**24**	P5.1	D22	2.40	b	2,10		2,20		**2,20**		0,15	6,82
10	**38**	P5.5	D22	2,20		2,10		2,30		**2,20**		0,10	4,55
11	**45**	P5.5	D31	2,20		2,20		2,20		**2,20**		0,00	0,00
12	**55**	P5.5	D22	2,30		2,20		2,30		**2,28**		0,06	2,63
13	**4a**	P9.1	D41	2.00	b	2,30		2.70	b	**2,30**		0,35	15,22
14	**37**	P5.1	D31	2,30		2,40		2,30		**2,32**		0,06	2,59
15	**47**	P4.1	D32	2,30		2,30		2,40		**2,32**		0,06	2,59
16	**26**	P5.1	D31	2,35		2,33		2,33		**2,34**		0,01	0,43
17	**42**	P4.1	D22	2,40		2,50		2,40		**2,42**		0,06	2,48
18	**17**	P5.1	D32	2,50		2,40		2,50		**2,48**		0,06	2,42
19	**9**	P5.5	D31	2.30	b	2,50		2,60		**2,50**		0,15	6,00
20	**40**	P3.11	D31	2,60		2,40		2,50		**2,50**		0,10	4,00
21	**44**	P4.1	D32	2.80	b	2,40		2,50		**2,50**		0,21	8,40
22	**39**	P5.5	D35	2,50		2,60		2,50		**2,52**		0,06	2,38
23	**54**	P3.2	D35	2,60		2,60		2.40	b	**2,58**		0,12	4,65
24	**41**	P4.1	D31	2,60		2,50		2,70		**2,60**		0,10	3,85
25	**50**	P4.1	D31	2,50		2.80	b	2,60		**2,60**		0,15	5,77
26	**4**	P.51	D22	2,73		2,79		2,72		**2,74**		0,04	1,46
27	**33**	P5.1	D22	3.10	a	3.20	a	3.00	a	**3,10**	*	0,10	3,23
28	**36**	P3.3	D22	3.20	a	3.00	ab	3.30	a	**3,20**	*	0,15	4,69
29	**27**	P6.1	D21	7.00	a	7.20	ab	7.00	a	**7,02**	*	0,12	1,71
30	**52**	P4.1	D31	30.00	ab	31.20	a	31.50	ab	**31,20**	*	0,79	2,53

Mean	Interlab.std. deviation	
	abs.	rel.%
2,35	**0,14**	**5,22**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **20,0**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Pb**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**8**	P3.2	D41	0.40	b	0,30		0.20	b	**0,30**	*	0,10	33,33
2	**9**	P5.5	D31	0,30		0,30		0.60	b	**0,30**	*	0,17	56,67
3	**20**	P5.1	D22	0,30		0,30		0,30		**0,30**	*	0,00	0,00
4	**38**	P5.5	D22	0,34		0.35	b	0.33	b	**0,34**	*	0,01	2,94
5	**11**	P5.1	D22	0,40		0.30	b	0,40		**0,40**		0,06	15,00
6	**37**	P5.1	D31	0,40		0.30	b	0,40		**0,40**		0,06	15,00
7	**39**	P5.5	D35	0,40		0,40		0,40		**0,40**		0,00	0,00
8	**45**	P5.5	D31	0,40		0,40		0,40		**0,40**		0,00	0,00
9	**47**	P4.1	D32	0,40		0,40		0,40		**0,40**		0,00	0,00
10	**4**	P.51	D22	0,44		0.42	b	0.47	b	**0,44**		0,03	6,82
11	**33**	P5.1	D22	0,50		0.40	b	0.60	b	**0,50**		0,10	20,00
12	**41**	P4.1	D31	0,50						**0,50**			0,00
13	**42**	P4.1	D22	0,50		0.51	b	0.46	b	**0,50**		0,03	6,00
14	**44**	P4.1	D32	0.40	b	0,50		0,50		**0,50**		0,06	12,00
15	**55**	P5.5	D22	0.40	b	0,50		0,50		**0,50**		0,06	12,00
16	**26**	P5.1	D31	0,61		0.59	b	0.66	b	**0,61**		0,04	6,56
17	**40**	P3.11	D31	0,66		0.74	b	0.62	b	**0,66**		0,06	9,09
18	**24**	P5.1	D22	0,70		0,70		0,70		**0,70**		0,00	0,00
19	**25**	P5.1	D22	0,90		1.00	b	0,90		**0,90**	*	0,06	6,67
20	**50**	P4.1	D31	0.90	ab	1.00	a	1.20	ab	**1,00**	*	0,15	15,00
21	**36**	P3.3	D22	1.30	ab	1.10	a	1.00	ab	**1,10**	*	0,15	13,64
22	**18**	P6.4	D31	0.20	ab	1.80	ab	1.30	a	**1,30**	*	0,82	63,08
23	**54**	P3.2	D35	2.30	a	2.50	ab	2.20	ab	**2,30**	*	0,15	6,52
24	**52**	P4.1	D31	25.90	ab	26.70	a	26.80	ab	**26,70**	*	0,49	1,84

Mean	Interlab.std. deviation	
	abs.	rel.%
0,55	**0,11**	**12,59**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **41,7**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **0,61**

ICP-Forests 5th needle/leaf labtest 01/02

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	**55a**	P9.1	D42	0.10	a	0.10	a	0.20	ab	**0,10**	*	0,06	60,00
2	**9**	P5.5	D31	0,50		0,50		0.60	b	**0,50**	*	0,06	12,00
3	**40**	P3.11	D31	0.62	b	0.51	b	0,54		**0,54**	*	0,06	11,11
4	**18**	P6.4	D31	1.10	b	0,60		0.00	b	**0,60**		0,55	91,67
5	**41**	P4.1	D31	0.90	b	0.50	b	0,60		**0,60**		0,21	35,00
6	**38**	P5.5	D22	0.68	b	0,69		0.72	b	**0,69**		0,02	2,90
7	**8**	P3.2	D41	0,70		0,70		0,70		**0,70**		0,00	0,00
8	**11**	P5.1	D22	0,70		0,70		0,70		**0,70**		0,00	0,00
9	**20**	P5.1	D22	0.60	b	0,70		0,70		**0,70**		0,06	8,57
10	**24**	P5.1	D22	0,70		0,70		0,70		**0,70**		0,00	0,00
11	**37**	P5.1	D31	0,70		0,70		0,70		**0,70**		0,00	0,00
12	**45**	P5.5	D31	0,70		0,70		0,70		**0,70**		0,00	0,00
13	**44**	P4.1	D32	0,80		0,80		0.90	b	**0,80**		0,06	7,50
14	**26**	P5.1	D31	0.83	b	0,82		0.76	b	**0,82**		0,04	4,88
15	**42**	P4.1	D22	0,87		0.88	b	0.82	b	**0,87**		0,03	3,45
16	**4**	P.51	D22	0,88		0.89	b	0.85	b	**0,88**		0,02	2,27
17	**39**	P5.5	D35	0,90		0,90		0.80	b	**0,90**		0,06	6,67
18	**54**	P3.2	D35	0.80	b	0,90		0,90		**0,90**		0,06	6,67
19	**55**	P5.5	D22	0,90		0,90		0,90		**0,90**		0,00	0,00
20	**46**	P5.2	D32	1.10	b	0.70	b	1,00		**1,00**		0,21	21,00
21	**47**	P4.1	D32	0.90	b	1.10	b	1,00		**1,00**		0,10	10,00
22	**33**	P5.1	D22	1,10		1,10		1.20	b	**1,10**	*	0,06	5,45
23	**36**	P3.3	D22	1.20	ab	1.40	ab	1.30	a	**1,30**	*	0,10	7,69
24	**50**	P4.1	D31	1.40	ab	1.50	a	1.60	ab	**1,50**	*	0,10	6,67
25	**25**	P5.1	D22	2.10	a	2.20	ab	2.10	a	**2,10**	*	0,06	2,86
26	**52**	P4.1	D31	65.30	ab	61.20	ab	62.10	a	**62,10**	*	2,15	3,46

Mean	Interlab.std. deviation	
	abs.	rel.%
0,82	**0,16**	**11,92**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **30,8**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Pb**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**46**	P5.2	D32	1.40	a	1.30	ab	1.70	ab	**1,40**		0,21	15,00
2	**4a**	P9.1	D41	1,60		1.30	b	2.30	b	**1,60**		0,51	31,88
3	**11**	P5.1	D22	1,60		1.70	b	1,60		**1,60**		0,06	3,75
4	**36**	P3.3	D22	1.50	b	1,60		1.80	b	**1,60**		0,15	9,38
5	**55a**	P9.1	D42	1,70		1.60	b	1.90	b	**1,70**		0,15	8,82
6	**2**	P5.3	D31	1.60	b	1,80		1,80		**1,80**		0,12	6,67
7	**8**	P3.2	D41	1,80		1.90	b	1.70	b	**1,80**		0,10	5,56
8	**20**	P5.1	D22	1.90	b	1,80		1,80		**1,80**		0,06	3,33
9	**33**	P5.1	D22	1,80		1.70	b	1.90	b	**1,80**		0,10	5,56
10	**9**	P5.5	D31	2.00	b	1.80	b	1,90		**1,90**		0,10	5,26
11	**38**	P5.5	D22	1,90		1,90		2.00	b	**1,90**		0,06	3,16
12	**54**	P3.2	D35	1,90		2.00	b	1,90		**1,90**		0,06	3,16
13	**17**	P5.1	D32	2,00		1.90	b	2.20	b	**2,00**		0,15	7,50
14	**37**	P5.1	D31	2.10	b	2,00		2,00		**2,00**		0,06	3,00
15	**41**	P4.1	D31	2.20	b	2,00		1.60	b	**2,00**		0,31	15,50
16	**42**	P4.1	D22	2,00		2,00		1.90	b	**2,00**		0,06	3,00
17	**45**	P5.5	D31	2,00		2,00		2,00		**2,00**		0,00	0,00
18	**55**	P5.5	D22	2,00		1.90	b	2,00		**2,00**		0,06	3,00
19	**4**	P.51	D22	2,10		2,10		2.12	b	**2,10**		0,01	0,48
20	**47**	P4.1	D32	2,10		2.00	b	2,10		**2,10**		0,06	2,86
21	**40**	P3.11	D31	2.05	b	2.24	b	2,16		**2,16**		0,10	4,63
22	**25**	P5.1	D22	2,20		2.30	b	2,20		**2,20**		0,06	2,73
23	**39**	P5.5	D35	2,20		2.10	b	2,20		**2,20**		0,06	2,73
24	**44**	P4.1	D32	2.30	b	2.10	b	2,20		**2,20**		0,10	4,55
25	**26**	P5.1	D31	2,24		2.14	b	2.27	b	**2,24**		0,07	3,13
26	**24**	P5.1	D22	2,30		2,30		2.20	b	**2,30**		0,06	2,61
27	**50**	P4.1	D31	2,30		2,30		2.60	b	**2,30**		0,17	7,39
28	**18**	P6.4	D31	3.00	ab	1.90	ab	2.70	a	**2,70**	*	0,57	21,11
29	**52**	P4.1	D31	204.10	ab	201.20	a	200.00	ab	**201,20**	*	2,11	1,05

Mean	Interlab.std. deviation	
	abs.	rel.%
1,99	**0,20**	**6,44**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,9**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**45**	P5.5	D31	10.00	a	10.00	a	10.00	a	**10,00**	*	0,00	0,00
2	**20**	P5.1	D22	18,00		20,00		20,00		**19,33**	*	1,15	5,95
3	**47**	P4.1	D32	25.00	b	21,00		19,00		**21,11**	*	3,06	14,50
4	**4**	P.51	D22	20,90		21,20		22,10		**21,40**	*	0,62	2,90
5	**54**	P3.2	D35	29.00	b	21,00		22,00		**22,61**	*	4,36	19,28
6	**42**	P4.1	D31	28,00		25,00		28,00		**27,00**		1,73	6,41
7	**39**	P5.5	D35	30,00		26,00		27,00		**27,61**		2,08	7,53
8	**38**	P5.5	D22	28,00		29,00		27,00		**28,00**		1,00	3,57
9	**37**	P5.1	D31	30,00		28,00		28,00		**28,67**		1,15	4,01
10	**8**	P3.2	D41	30,60		34.10	b	29,00		**30,91**		2,61	8,44
11	**50**	P4.1	D31	29.00	b	42.00	b	36,00		**36,00**		6,51	18,08
12	**55**	P5.5	D22	35,00		37,00		36,00		**36,00**		1,00	2,78
13	**33**	P5.1	D22	38,00		39,00		37,00		**38,00**		1,00	2,63
14	**18**	P6.4	D31	41,00		41,00		61.00	b	**42,11**		11,55	27,43
15	**26**	P5.1	D31	40.00	b	45,00		50.00	b	**45,00**	*	5,00	11,11
16	**40**	P3.11	D31	49.00	b	55.00	b	52,00		**52,00**	*	3,00	5,77
17	**25**	P5.1	D22	67.00	a	66.00	a	64.00	a	**65,67**	*	1,53	2,33
18	**36**	P3.3	D22	288.00	a	246.00	ab	316.00	ab	**288,00**	*	35,23	12,23
19	**24**	P5.1	D22	2619.00	ab	2515.00	a	2405.00	ab	**2515,00**	*	107,01	4,25

Mean	Interlab.std. deviation	
	abs.	rel.%
34,54	**9,98**	**8,38**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **52,6**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Cd**
Dimension: **ng/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**54**	P3.2	D35	88,00		92.00	b	85,00		**88,00**		3,51	3,99
2	**45**	P5.5	D31	88,00		87,00		90,00		**88,33**		1,53	1,73
3	**41**	P4.1	D31	50.00	b	90,00		90,00		**88,89**		23,09	25,98
4	**20**	P5.1	D22	89,00		87,00		91,00		**89,00**		2,00	2,25
5	**8**	P3.2	D41	90,20		93,00		93,90		**92,37**		1,93	2,09
6	**47**	P4.1	D32	96,00		111.00	b	98,00		**98,11**		8,14	8,30
7	**37**	P5.1	D31	98,00		100,00		101,00		**99,67**		1,53	1,54
8	**38**	P5.5	D22	99,00		100,00		103,00		**100,61**		2,08	2,07
9	**39**	P5.5	D35	99,00		100,00		105.00	b	**100,61**		3,21	3,19
10	**4**	P.51	D22	101,80		100,70		100,40		**100,97**		0,74	0,73
11	**26**	P5.1	D31	100,00		120.00	b	100,00		**101,11**		11,55	11,42
12	**40**	P3.11	D31	94.00	b	111.00	b	102,00		**102,00**		8,50	8,33
13	**17**	P5.1	D32	105,00		102,00		102,00		**103,00**		1,73	1,68
14	**50**	P4.1	D31	104,00		107,00		101,00		**104,00**		3,00	2,88
15	**55**	P5.5	D22	110,00		108,00		102.00	b	**107,89**		4,16	3,86
16	**33**	P5.1	D22	111,00		110,00		112,00		**111,00**		1,00	0,90
17	**42**	P4.1	D31	110,00		120.00	b	110,00		**111,11**		5,77	5,19
18	**25**	P5.1	D22	117,00		116,00		114,00		**115,67**		1,53	1,32
19	**18**	P6.4	D31	102.00	b	121,00		121,00		**119,89**		10,97	9,15
20	**9**	P5.5	D31	116.00	ab	128.80	a	131.20	a	**128,80**		8,17	6,34
21	**36**	P3.3	D22	288.00	a	254.00	ab	306.00	ab	**288,00**	*	26,41	9,17
22	**24**	P5.1	D22	1084.00	ab	1662.00	ab	1089.00	a	**1089,00**	*	332,27	30,51

Mean	Interlab.std. deviation	
	abs.	rel.%
104,40	**21,04**	**6,48**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **9,1**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **130,30**

ICP-Forests 5th needle/leaf labtest 01/02

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	**41**	P4.1	D31	90.00	ab	50.00	ab	60.00	a	**60,00**	*	20,82	34,70
2	**45**	P5.5	D31	61.00	a	64.00	a	62.00	a	**62,33**	*	1,53	2,45
3	**18**	P6.4	D31	81,00		142.00	b	81,00		**82,11**		35,22	42,89
4	**8**	P3.2	D41	86,30		86,30		91.70	b	**87,41**		3,12	3,57
5	**54**	P3.2	D35	99.00	b	88,00		86,00		**88,11**		7,00	7,94
6	**26**	P5.1	D31	90,00		95,00		90,00		**91,11**		2,89	3,17
7	**20**	P5.1	D22	99,00		95,00		93,00		**95,11**		3,06	3,22
8	**50**	P4.1	D31	96,00		97,00		101,00		**97,61**		2,65	2,71
9	**37**	P5.1	D31	99,00		98,00		99,00		**98,67**		0,58	0,59
10	**47**	P4.1	D32	100,00		98,00		101,00		**99,67**		1,53	1,54
11	**4**	P.51	D22	100,90		104,80		98,60		**100,90**		3,13	3,10
12	**33**	P5.1	D22	101,00		100,00		102,00		**101,00**		1,00	0,99
13	**38**	P5.5	D22	100,00		103,00		103,00		**102,00**		1,73	1,70
14	**39**	P5.5	D35	109,00		106,00		98.00	b	**106,00**		5,69	5,37
15	**55**	P5.5	D22	107,00		109,00		102.00	b	**106,89**		3,61	3,38
16	**42**	P4.1	D31	110,00		110,00		110,00		**110,00**		0,00	0,00
17	**17**	P5.1	D32	111,00		114,00		110,00		**111,61**		2,08	1,86
18	**40**	P3.11	D31	115,00		112,00		124.00	b	**115,00**		6,24	5,43
19	**25**	P5.1	D22	121,00		120,00		122,00		**121,00**		1,00	0,83
20	**9**	P5.5	D31	121,60		103.00	b	154.50	b	**121,60**		26,08	21,45
21	**46**	P5.2	D32	207.40	ab	227.60	ab	213.60	a	**213,60**	*	10,35	4,85
22	**36**	P3.3	D22	446.00	a	472.00	ab	424.00	ab	**446,00**	*	24,03	5,39
23	**24**	P5.1	D22	8722.00	ab	9572.00	ab	9360.00	a	**9360,00**	*	442,43	4,73

Mean	Interlab.std. deviation	
	abs.	rel.%
103,30	**26,34**	**7,04**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **21,7**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Cd**
Dimension: **ng/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**25**	P5.1	D22	357.00	a	351.00	a	369.00	a	**357,00**		9,17	2,57
2	**40**	P3.11	D31	380,00		369,00		386,00		**380,00**		8,62	2,27
3	**8**	P3.2	D41	391,00		399,00		381,00		**391,00**		9,02	2,31
4	**4a**	P9.1	D41	400,00		500.00	b	400,00		**402,22**		57,74	14,36
5	**55**	P5.5	D22	430.00	b	406,00		405,00		**407,72**		14,15	3,47
6	**54**	P3.2	D35	410,00		401,00		422,00		**410,00**		10,54	2,57
7	**45**	P5.5	D31	410,00		414,00		416,00		**413,33**		3,06	0,74
8	**9**	P5.5	D31	384.00	b	415,10		431.70	b	**415,10**		24,21	5,83
9	**18**	P6.4	D31	405.00	b	425,00		425,00		**422,78**		11,55	2,73
10	**17**	P5.1	D32	427,00		431,00		433,00		**430,33**		3,06	0,71
11	**47**	P4.1	D32	440,00		431,00		433,00		**434,22**		4,73	1,09
12	**26**	P5.1	D31	420.00	b	440,00		440,00		**437,78**		11,55	2,64
13	**20**	P5.1	D22	441,00		455.00	b	428.00	b	**441,00**		13,50	3,06
14	**41**	P4.1	D31	450,00		450,00		440,00		**447,78**		5,77	1,29
15	**4**	P.51	D22	452,20		450,40		437,90		**449,08**		7,79	1,73
16	**50**	P4.1	D31	443,00		453,00		452,00		**450,28**		5,51	1,22
17	**39**	P5.5	D35	468.00	b	438.00	b	454,00		**454,00**		15,01	3,31
18	**42**	P4.1	D31	470,00		470,00		460,00		**467,78**		5,77	1,23
19	**37**	P5.1	D31	474,00		470,00		480,00		**474,22**		5,03	1,06
20	**44**	P4.1	D32	490,00		500,00		580.00	b	**500,00**		49,33	9,87
21	**33**	P5.1	D22	520.00	a	515.00	a	521.00	a	**518,67**		3,21	0,62
22	**38**	P5.5	D22	529.00	a	508.00	ab	529.00	a	**526,78**		12,12	2,30
23	**36**	P3.3	D22	728.00	a	744.00	ab	680.00	ab	**728,00**	*	33,31	4,58
24	**24**	P5.1	D22	4867.00	ab	4733.00	ab	4854.00	a	**4854,00**	*	73,90	1,52

Mean	Interlab.std. deviation	
	abs.	rel.%
443,20	**16,57**	**3,04**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **8,3**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**8**	P6.1	D31	17.50	a	17.00	a	15.80	ab	**17,00**		0,87	5,12
2	**14**	P4.1	D31	18,04		18,07		20.00	b	**18,24**		1,12	6,14
3	**25**	P5.1	D31	10.00	b	18,80		19,10		**18,77**		5,17	27,54
4	**29**	P3.3	D31	19,02		17.82	b	19,42		**19,02**		0,83	4,36
5	**6**	P3.2	D31	20,05		19,39		19,23		**19,49**		0,43	2,21
6	**4**	P5.1	D31	19,59		19,15		19,89		**19,56**		0,37	1,89
7	**18**	P6.4	D31	19,35		19,52		19,80		**19,56**		0,23	1,18
8	**45**	P5.5	D31	18.80	b	20,00		19,70		**19,67**		0,62	3,15
9	**17**	P5.1	D31	19,99		20,64		20,25		**20,29**		0,33	1,63
10	**16**	P5.5	D31	20,60		19.50	b	20,40		**20,32**		0,59	2,90
11	**55**	P5.5	D31	20,40		20,40		20,20		**20,33**		0,12	0,59
12	**50**	P4.1	D31	20,16		20,32		20,62		**20,37**		0,23	1,13
13	**28**	P6.5	D54.2	19.32	b	22.15	b	20,57		**20,57**		1,42	6,90
14	**42**	P4.1	D31	21,00		21,00		20,50		**20,83**		0,29	1,39
15	**7**	P5.5	D31	20,90		21,10		21,10		**21,03**		0,12	0,57
16	**37**	P5.1	D31	20,98		21,08		21,08		**21,05**		0,06	0,29
17	**20**	P5.1	D31	22.72	b	18.74	b	21,57		**21,57**		2,05	9,50
18	**38**	P5.5	D31	21,90		21,40		21,60		**21,63**		0,25	1,16
19	**40**	P3.11	D31	22.40	b	21,39		21,53		**21,64**		0,55	2,54
20	**39**	P5.5	D31	20.95	b	21,71		22,04		**21,69**		0,56	2,58
21	**26**	P5.1	D31	21,80		21,75		21,73		**21,76**		0,04	0,18
22	**2**	P5.3	D31	22,10		22,10		22,60		**22,27**		0,29	1,30
23	**24**	P6.4	D54.1	23.56	a	22.75	ab	24.38	ab	**23,56**		0,82	3,48
24	**23**	P3.3	D31	30.36	ab	23.58	a	17.89	ab	**23,58**		6,24	26,46
25	**43**	P4.1	D31	26.60	ab	23.60	ab	25.30	a	**25,30**	*	1,50	5,93
26	**36**	P6.1	D54.2	30.08	a	30.22	a	31.10	ab	**30,33**	*	0,55	1,81

Mean	Interlab.std. deviation	
	abs.	rel.%
20,80	**0,99**	**4,69**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **7,7**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **B**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**20**	P5.1	D31	7.77	ab	7.05	a	5.89	ab	**7,05**	*	0,95	13,48
2	**8**	P6.1	D31	9.19	a	10.20	ab	8.89	a	**9,19**	*	0,69	7,51
3	**40**	P3.11	D31	10,62		9.88	b	10,44		**10,42**		0,39	3,74
4	**14**	P4.1	D31	9.64	b	10,58		10,88		**10,58**		0,65	6,14
5	**28**	P6.5	D54.2	10,60		9.62	b	10,90		**10,60**		0,67	6,32
6	**6**	P3.2	D31	10,51		10,64		10,87		**10,67**		0,18	1,69
7	**23**	P3.3	D31	8.51	b	13.19	b	10,70		**10,70**		2,34	21,87
8	**45**	P5.5	D31	12.60	b	11,00		11,00		**11,11**		0,92	8,28
9	**25**	P5.1	D31	11,30		11,10		11,10		**11,17**		0,12	1,07
10	**50**	P4.1	D31	10,99		11,30		11,39		**11,23**		0,21	1,87
11	**18**	P6.4	D31	15.64	b	11,31		11,17		**11,35**		2,54	22,38
12	**55**	P5.5	D31	11,60		11.00	b	11,60		**11,49**		0,35	3,05
13	**4**	P5.1	D31	11,30		11,68		11,69		**11,57**		0,22	1,90
14	**17**	P5.1	D31	11,86		11,68		12,01		**11,85**		0,17	1,43
15	**42**	P4.1	D31	12,00		12,00		11.50	b	**11,89**		0,29	2,44
16	**38**	P5.5	D31	12.30	b	11,90		11,70		**11,91**		0,31	2,60
17	**16**	P5.5	D31	11,90		11,80		12,10		**11,93**		0,15	1,26
18	**37**	P5.1	D31	11,86		12,01		11,96		**11,94**		0,08	0,67
19	**7**	P5.5	D31	12,10		12,10		12,00		**12,07**		0,06	0,50
20	**26**	P5.1	D31	12,50		12,20		12,06		**12,24**		0,22	1,80
21	**39**	P5.5	D31	12,38		12,48		12,42		**12,43**		0,05	0,40
22	**2**	P5.3	D31	12,70		12,70		12,50		**12,63**		0,12	0,95
23	**29**	P3.3	D31	12,71		12,80		11.90	b	**12,64**		0,50	3,96
24	**24**	P6.4	D54.1	13.28	b	11.50	b	12,82		**12,82**		0,92	7,18
25	**43**	P4.1	D31	14.10	a	14.40	a	13.90	a	**14,11**	*	0,25	1,77
26	**36**	P6.1	D54.2	16.00	a	15.83	a	16.21	a	**16,01**	*	0,19	1,19

	Mean	Interlab.std. deviation	
		abs.	rel.%
	11,60	**0,52**	**4,82**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **15,4**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **11,82**

ICP-Forests 5th needle/leaf labtest 01/02

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	**8**	P6.1	D31	5.83	a	6.39	ab	5.78	a	**5,89**	*	0,34	5,77
2	**14**	P4.1	D31	8.05	a	8.29	a	8.43	a	**8,27**	*	0,19	2,30
3	**28**	P6.5	D54.2	7.70	b	8,78		8,83		**8,72**		0,64	7,34
4	**40**	P3.11	D31	8,64		9,23		8,91		**8,91**		0,30	3,37
5	**6**	P3.2	D31	9,03		8,97		8,88		**8,96**		0,08	0,89
6	**4**	P5.1	D31	9,48		9,44		10.28	b	**9,55**		0,47	4,92
7	**50**	P4.1	D31	9,50		9,73		9,63		**9,62**		0,12	1,25
8	**25**	P5.1	D31	9,85		9,65		9,57		**9,69**		0,14	1,44
9	**18**	P6.4	D31	9,73		13.62	b	9,69		**9,80**		2,26	23,06
10	**7**	P5.5	D31	10,10		9,98		10,10		**10,06**		0,07	0,70
11	**17**	P5.1	D31	10,32		10,27		10,53		**10,37**		0,14	1,35
12	**26**	P5.1	D31	10,40		10,10		11.07	b	**10,40**		0,50	4,81
13	**38**	P5.5	D31	10,10		10,40		11.00	b	**10,40**		0,46	4,42
14	**55**	P5.5	D31	10,50		10,70		10,20		**10,50**		0,25	2,38
15	**37**	P5.1	D31	10,59		10,62		10,51		**10,57**		0,06	0,57
16	**29**	P3.3	D31	10.02	b	11,01		10,64		**10,64**		0,50	4,70
17	**45**	P5.5	D31	11.70	b	10,90		9.80	b	**10,90**		0,95	8,72
18	**42**	P4.1	D31	11,00		11,00		10.50	b	**10,91**		0,29	2,66
19	**2**	P5.3	D31	11,50		11,50		11,50		**11,50**		0,00	0,00
20	**16**	P5.5	D31	11,50		11,30		11,80		**11,50**		0,25	2,17
21	**23**	P3.3	D31	11,57		15.06	b	10.76	b	**11,57**		2,28	19,71
22	**39**	P5.5	D31	11,94		11,62		10.54	b	**11,62**		0,73	6,28
23	**43**	P4.1	D31	13.80	b	10.50	b	11,80		**11,80**		1,66	14,07
24	**24**	P6.4	D54.1	14.15	a	14.62	ab	13.76	ab	**14,15**	*	0,43	3,04
25	**20**	P5.1	D31	17.25	ab	14.91	a	14.97	a	**15,03**	*	1,33	8,85
26	**36**	P6.1	D54.2	15.30	a	15.08	a	16.00	ab	**15,30**	*	0,48	3,14

Mean	Interlab.std. deviation	
	abs.	rel.%
10,48	**0,57**	**5,30**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **19,2**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **B**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**39**	P5.5	D31	12.01	a	11.68	a	10.60	ab	**11,68**	*	0,74	6,34
2	**8**	P6.1	D31	16.60	ab	15.20	a	12.10	ab	**15,20**		2,30	15,13
3	**23**	P3.3	D31	19.57	ab	11.86	ab	15.25	a	**15,25**		3,86	25,31
4	**14**	P4.1	D31	15.43	b	16,32		17.33	b	**16,32**		0,95	5,82
5	**24**	P6.4	D54.1	17,20		16.32	b	16,95		**16,95**		0,45	2,65
6	**6**	P3.2	D31	17,22		17,62		17,06		**17,25**		0,29	1,68
7	**18**	P6.4	D31	17,41		17,22		17,30		**17,31**		0,10	0,58
8	**25**	P5.1	D31	17,10		17,60		17,30		**17,31**		0,25	1,44
9	**28**	P6.5	D54.2	17.95	b	17,31		16.41	b	**17,31**		0,77	4,45
10	**29**	P3.3	D31	17,42		17,52		17,12		**17,36**		0,21	1,21
11	**50**	P4.1	D31	17,52		17,59		17,57		**17,56**		0,04	0,23
12	**4**	P5.1	D31	17,85		17.19	b	17,92		**17,77**		0,40	2,25
13	**17**	P5.1	D31	17,74		18,28		18,21		**18,13**		0,29	1,60
14	**40**	P3.11	D31	18,31		18,57		17.82	b	**18,31**		0,38	2,08
15	**55**	P5.5	D31	18,50		18,20		18,60		**18,44**		0,21	1,14
16	**45**	P5.5	D31	18,50		18,90		17.70	b	**18,50**		0,61	3,30
17	**7**	P5.5	D31	18,70		18,70		18,40		**18,60**		0,17	0,91
18	**26**	P5.1	D31	19,00		18,66		18,93		**18,86**		0,18	0,95
19	**42**	P4.1	D31	19,00		19,00		18,50		**18,89**		0,29	1,54
20	**16**	P5.5	D31	18,80		19,00		19,10		**18,97**		0,15	0,79
21	**38**	P5.5	D31	19,50		19,80		19,60		**19,63**		0,15	0,76
22	**37**	P5.1	D31	19,80		19,74		19,70		**19,75**		0,05	0,25
23	**2**	P5.3	D31	19,80		20.60	b	20,10		**20,10**		0,40	1,99
24	**43**	P4.1	D31	20,10		20,30		20.80	b	**20,31**		0,36	1,77
25	**20**	P5.1	D31	19.94	ab	22.94	ab	21.19	a	**21,19**		1,51	7,13
26	**36**	P6.1	D54.2	28.00	ab	26.24	a	25.85	a	**26,24**	*	1,15	4,38

Mean	Interlab.std. deviation	
	abs.	rel.%
18,17	**0,63**	**3,68**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **7,7**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **C**
Dimension: **%**
Sample: **1** **SPRUCE NEEDLES (Slovakia)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**2**	P1	D13	45.50	a	45.60	a	45.30	ab	**45,50**	*	0,15	0,33
2	**39**	P1	D10	47.60	ab	47.20	a	46.90	ab	**47,20**	*	0,35	0,74
3	**6**	P1	D15	47.23	ab	47.45	a	47.51	a	**47,44**	*	0,15	0,32
4	**9**	P1	D81	47.48	a	47.49	a	47.53	a	**47,50**	*	0,03	0,06
5	**4**	P1	D17.1	47.40	ab	47.60	a	47.60	a	**47,56**	*	0,12	0,25
6	**12**	P1	D17.1	49,65		49,65		49,64		**49,65**		0,01	0,02
7	**41**	P1	D15.4	49,91		50.15	b	49,99		**49,99**		0,12	0,24
8	**45**	P0	D0	49,93		50,03		50.19	b	**50,03**		0,13	0,26
9	**36**	P3.21	D82.3	50,22		50,01		50,13		**50,13**		0,11	0,22
10	**37**	P1	D10	50,11		50,20		50,26		**50,19**		0,08	0,16
11	**11**	P1	D13	50,26		50.02	b	50,37		**50,26**		0,18	0,36
12	**40**	P1	D10	50.08	b	50,37		50,26		**50,26**		0,15	0,30
13	**42**	P1	D10	50,39		50,21		50,29		**50,29**		0,09	0,18
14	**52**	P1	D15.2	50,50		50,50		50,40		**50,47**		0,06	0,12
15	**7**	P1	D15	50,50		50.70	b	50,40		**50,50**		0,15	0,30
16	**48**	P1	D10	50,54		50,61		50,49		**50,55**		0,06	0,12
17	**38**	P1	D10	50,60		50,60		50.30	b	**50,56**		0,17	0,34
18	**50**	P1	D10	50,67		50,66		50,65		**50,66**		0,01	0,02
19	**46**	P1	D15.3	51,07		51,10		51,14		**51,10**		0,04	0,08
20	**44**	P1	D10	51,38		51.59	b	51,27		**51,38**		0,16	0,31
21	**19**	P1	D10	51.15	b	51,43		51.75	b	**51,43**		0,30	0,58
22	**24**	P0	D0	51,32		51,51		51,44		**51,43**		0,10	0,19
23	**47**	P1	D15.4	51,72		51,70		51,72		**51,71**		0,01	0,02
24	**13**	P1	D17.1	51,98		51.66	b	52,09		**51,98**		0,22	0,42
25	**55**	P1	D10	52,75		52.59	b	52.99	b	**52,75**		0,20	0,38
26	**20**	P1	D18.1	53,01		53,04		52,86		**52,98**		0,10	0,19
27	**15**	P1	D17.1	52.36	b	53,08		53.33	b	**53,08**		0,50	0,94
28	**8**	P1	D15	53.50	ab	53.10	a	53.10	a	**53,14**	*	0,23	0,43

Mean	Interlab.std. deviation	
	abs.	rel.%
50,56	**0,14**	**0,28**

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

*** =not tolerable mean because more than +/- 5 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **21,4**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **C**
Dimension: **%**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	Lab.code	Method codes		Replications						Lab.mean		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**2**	P1	D13	48.40	a	49.00	ab	48.40	a	**48,42**	*	0,35	0,72
2	**39**	P1	D10	48.50	ab	49.00	a	49.60	ab	**49,00**	*	0,55	1,12
3	**9**	P1	D81	49.04	a	49.05	a	49.05	a	**49,05**	*	0,01	0,02
4	**6**	P1	D15	49.46	ab	49.28	a	49.17	a	**49,28**	*	0,15	0,30
5	**4**	P1	D17.1	49.40	a	48.90	ab	49.90	ab	**49,40**	*	0,50	1,01
6	**11**	P1	D13	50.11	b	49,77		49,71		**49,77**		0,22	0,44
7	**12**	P1	D17.1	51,29		51,20		51,35		**51,29**		0,08	0,16
8	**24**	P0	D0	51,59		51,75		51,63		**51,63**		0,08	0,15
9	**41**	P1	D15.4	50.09	b	52,03		52,14		**52,03**		1,15	2,21
10	**45**	P0	D0	52.23	b	52,04		52,06		**52,07**		0,10	0,19
11	**42**	P1	D10	52,22		52,19		52,21		**52,21**		0,02	0,04
12	**40**	P1	D10	52,22		52,31		52,15		**52,22**		0,08	0,15
13	**37**	P1	D10	52,28		52,40		52,30		**52,31**		0,06	0,11
14	**48**	P1	D10	52,29		52,32		52,35		**52,32**		0,03	0,06
15	**52**	P1	D15.2	52,30		52,30		52,40		**52,32**		0,06	0,11
16	**38**	P1	D10	52,40		52,40		52.00	b	**52,38**		0,23	0,44
17	**50**	P1	D10	52,53		52.34	b	52.85	b	**52,53**		0,26	0,49
18	**7**	P1	D15	52.90	b	52,70		52,60		**52,70**		0,15	0,28
19	**19**	P1	D10	52,80		52,88		52,95		**52,88**		0,08	0,15
20	**44**	P1	D10	53,05		53,05		52,94		**53,03**		0,06	0,11
21	**46**	P1	D15.3	53,06		53,06		53,08		**53,07**		0,01	0,02
22	**36**	P3.21	D82.3	53,20		53,13		52.92	b	**53,13**		0,15	0,28
23	**47**	P1	D15.4	53,28		53,30		53,33		**53,30**		0,03	0,06
24	**13**	P1	D17.1	54,03		54,03		53,93		**54,01**		0,06	0,11
25	**55**	P1	D10	54.15	b	54,39		54.90	b	**54,39**		0,38	0,70
26	**20**	P1	D18.1	54.30	b	54,69		54,69		**54,67**		0,23	0,42
27	**8**	P1	D15	55,00		55,10		54,90		**55,00**	*	0,10	0,18
28	**15**	P1	D17.1	54.17	ab	55.96	ab	55.74	a	**55,74**	*	0,98	1,76

	Mean	Interlab.std. deviation	
		abs.	rel.%
	52,33	**0,22**	**0,42**

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

*** =not tolerable mean because more than +/- 5 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **25,0**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **51,89**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**9**	P1	D81	48.72	a	48.72	a	48.72	a	**48,72**	*	0,00	0,00
2	**39**	P1	D10	48.80	a	48.70	ab	49.00	ab	**48,80**	*	0,15	0,31
3	**2**	P1	D13	49.50	b	49,70		50.20	b	**49,70**	*	0,36	0,72
4	**4**	P1	D17.1	49,80		49,80		49,80		**49,80**		0,00	0,00
5	**6**	P1	D15	49,89		49,89		49,97		**49,90**		0,05	0,10
6	**11**	P1	D13	50.99	b	50,68		49.81	b	**50,68**		0,61	1,20
7	**12**	P1	D17.1	51.49	b	51,27		51,25		**51,27**		0,13	0,25
8	**41**	P1	D15.4	51,96		51,85		51,91		**51,91**		0,06	0,12
9	**37**	P1	D10	51,91		51,96		52,00		**51,96**		0,05	0,10
10	**45**	P0	D0	51.91	b	52,04		52.13	b	**52,04**		0,11	0,21
11	**42**	P1	D10	52,08		52,15		52,09		**52,10**		0,04	0,08
12	**38**	P1	D10	52,20		52,20		51.80	b	**52,19**		0,23	0,44
13	**40**	P1	D10	52,21		52,26		52,22		**52,23**		0,03	0,06
14	**48**	P1	D10	52,22		52,22		52,25		**52,23**		0,02	0,04
15	**52**	P1	D15.2	52,50		52,51		52,50		**52,50**		0,01	0,02
16	**36**	P3.21	D82.3	52,53		52.91	b	52.32	b	**52,53**		0,30	0,57
17	**24**	P0	D0	52,49		52.67	b	52,54		**52,54**		0,09	0,17
18	**50**	P1	D10	52.84	b	52.58	b	52,67		**52,67**		0,13	0,25
19	**7**	P1	D15	52,70		52.40	b	52,70		**52,69**		0,17	0,32
20	**44**	P1	D10	52.84	b	53,06		53,06		**53,05**		0,13	0,25
21	**46**	P1	D15.3	53,05		53,07		53,12		**53,07**		0,04	0,08
22	**19**	P1	D10	53,14		53,22		53.04	b	**53,14**		0,09	0,17
23	**47**	P1	D15.4	53,33		53,35		53,31		**53,33**		0,02	0,04
24	**20**	P1	D18.1	54,71		54,76		54,70		**54,72**		0,03	0,05
25	**8**	P1	D15	54.50	b	54,80		55.00	b	**54,80**		0,25	0,46
26	**13**	P1	D17.1	54,90		55.01	b	54.80	b	**54,90**		0,11	0,20
27	**55**	P1	D10	54,94		54.51	b	54,94		**54,93**		0,25	0,46
28	**15**	P1	D17.1	55.70	a	55.34	ab	56.30	ab	**55,70**	*	0,48	0,86

Mean	Interlab.std. deviation	
	abs.	rel.%
52,34	**0,14**	**0,27**

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

*** =not tolerable mean because more than +/- 5 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **14,3**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **C**
Dimension: **%**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**2**	P1	D13	43.90	ab	48.50	ab	47.50	a	**47,50 ***	2,42	5,09
2	**39**	P1	D10	48.70	a	48.50	ab	48.80	a	**48,70 ***	0,15	0,31
3	**9**	P1	D81	48.91	a	48.90	a	48.90	a	**48,90 ***	0,01	0,02
4	**6**	P1	D15	49.02	ab	49.16	a	49.33	ab	**49,16 ***	0,16	0,33
5	**4**	P1	D17.1	50.30	ab	49.60	a	49.00	ab	**49,60 ***	0,65	1,31
6	**12**	P1	D17.1	51,20		51,17		51,15		**51,17**	0,03	0,06
7	**41**	P1	D15.4	51,77		51,66		51,75		**51,74**	0,06	0,12
8	**42**	P1	D10	51,98		51.81	b	51,96		**51,95**	0,09	0,17
9	**40**	P1	D10	52,05		52,01		51,92		**52,01**	0,07	0,13
10	**24**	P0	D0	52,10		51,95		52,04		**52,04**	0,08	0,15
11	**52**	P1	D15.2	52,06		52,08		52,08		**52,07**	0,01	0,02
12	**37**	P1	D10	52,07		52,11		52,07		**52,08**	0,02	0,04
13	**48**	P1	D10	52,15		52.32	b	52,13		**52,16**	0,10	0,19
14	**45**	P0	D0	52,08		52,29		52,17		**52,17**	0,11	0,21
15	**38**	P1	D10	52,30		52,30		51.90	b	**52,28**	0,23	0,44
16	**50**	P1	D10	52.57	b	52,28		52,18		**52,28**	0,20	0,38
17	**7**	P1	D15	52,60		52.90	b	52,60		**52,62**	0,17	0,32
18	**36**	P3.21	D82.3	52,62		52.46	b	53.06	b	**52,62**	0,31	0,59
19	**46**	P1	D15.3	52,93		52,94		52,97		**52,95**	0,02	0,04
20	**19**	P1	D10	53,20		53,01		53,08		**53,08**	0,10	0,19
21	**47**	P1	D15.4	53,46		53,35		53,31		**53,35**	0,08	0,15
22	**44**	P1	D10	53,38		53,38		53.16	b	**53,36**	0,13	0,24
23	**11**	P1	D13	53,85		53,71		53,74		**53,75**	0,07	0,13
24	**55**	P1	D10	54,03		53.90	b	54.57	b	**54,03**	0,36	0,67
25	**20**	P1	D18.1	54,48		54,40		54.23	b	**54,40**	0,13	0,24
26	**13**	P1	D17.1	54,56		54,45		54,35		**54,45**	0,11	0,20
27	**8**	P1	D15	54,90		54,90		54,90		**54,90**	0,00	0,00
28	**15**	P1	D17.1	55.76	a	55.61	a	55.64	a	**55,65 ***	0,08	0,14

Mean	Interlab.std. deviation	
	abs.	rel.%
52,39	**0,21**	**0,42**

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

*** =not tolerable mean because more than +/- 5 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **21,4**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**47**	P4.1	D32	28,30		28,90		29,00		**28,73**	*	0,38	1,32
2	**52**	P4.1	D31	30,40		30,20		30,60		**30,40**	*	0,20	0,66
3	**45**	P5.5	D31	31,00		31,00		30,00		**30,78**	*	0,58	1,88
4	**18**	P6.4	D31	30,60		32.60	b	30,60		**30,82**	*	1,15	3,73
5	**38**	P5.5	D31	32,00		32,00		32,00		**32,00**	*	0,00	0,00
6	**12**	P5.1	D31	123.80	b	28.50	b	32,70		**32,70**		53,85	164,68
7	**37**	P5.1	D35	32,80		32,00		33,10		**32,73**		0,57	1,74
8	**46**	P5.2	D31	34,00		35.40	b	32.30	b	**34,00**		1,55	4,56
9	**55**	P5.5	D31	35,80		33.30	b	36,00		**35,68**		1,50	4,20
10	**20**	P5.1	D31	36,30		35,90		34.00	b	**35,88**		1,23	3,43
11	**42**	P4.1	D31	37,00		35,00		36,00		**36,00**		1,00	2,78
12	**37a**	P9.1	D42	38,00		37,00		35.00	b	**37,00**		1,53	4,14
13	**50**	P4.1	D31	36,10		37,40		37,30		**37,13**		0,72	1,94
14	**4**	P5.1	D21.1	37,40		36,30		39.00	b	**37,40**		1,36	3,64
15	**33**	P5.1	D21	42,60		42,10		42,90		**42,53**		0,40	0,94
16	**40**	P3.11	D31	43,30		42,70		44,10		**43,30**		0,70	1,62
17	**54**	P3.2	D31	43.70	b	46,10		48.00	b	**46,10**		2,15	4,66
18	**36**	P3.3	D28	54,10		50.00	b	53,60		**53,60**		2,24	4,18
19	**27**	P6.1	D21	54,60		54,60		54,60		**54,60**		0,00	0,00
20	**26**	P5.1	D35	65.00	b	56,00		57,00		**57,00**		4,93	8,65
21	**8**	P3.2	D31	53.80	b	63,10		63,80		**63,10**	*	5,58	8,84
22	**30**	P6.5	D21.1	71,22		71,50		67.05	b	**71,14**	*	2,49	3,50
23	**43**	P4.1	D31	78.00	a	54.40	ab	81.50	ab	**78,00**	*	14,74	18,90
24	**23**	P3.3	D31	84.60	a	84.00	a	76.40	ab	**84,00**	*	4,57	5,44
25	**5**	P21	D28	90.00	a	105.00	ab	90.00	a	**90,22**	*	8,66	9,60
26	**9**	P5.5	D31	93.80	a	100.20	ab	93.60	a	**93,92**	*	3,75	3,99
27	**25**	P5.1	D31	99.30	a	98.50	a	98.40	a	**98,67**	*	0,49	0,50
28	**55a**	P9.1	D42	190.00	a	200.00	ab	190.00	a	**190,22**	*	5,77	3,03

Mean	Interlab.std. deviation	
	abs.	rel.%
46,39	**4,36**	**9,73**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **46,4**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Na**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**20**	P5.1	D31	16,40		14,70		13,20		**14,70 ***	1,60	10,88
2	**4**	P5.1	D21.1	16,30		19.10	b	16,50		**16,79 ***	1,56	9,29
3	**45**	P5.5	D31	22,00		22,00		21,00		**21,67 ***	0,58	2,68
4	**47**	P4.1	D32	23,10		22,20		22,20		**22,50 ***	0,52	2,31
5	**18**	P6.4	D31	26,30		22,30		24,30		**24,30 ***	2,00	8,23
6	**12**	P5.1	D31	26.60	b	24,40		21.50	b	**24,40 ***	2,56	10,49
7	**36**	P3.3	D28	24,00		24,40		26,00		**24,59**	1,06	4,31
8	**37**	P5.1	D35	24,40		25,20		25,10		**24,90**	0,44	1,77
9	**50**	P4.1	D31	25,20		24,70		25,10		**25,00**	0,26	1,04
10	**33**	P5.1	D21	25,80		26,00		25,70		**25,83**	0,15	0,58
11	**52**	P4.1	D31	25,70		26,20		26,30		**26,07**	0,32	1,23
12	**55**	P5.5	D31	25,60		27,70		25,90		**26,14**	1,14	4,36
13	**42**	P4.1	D31	29,00		29,00		28,90		**28,97**	0,06	0,21
14	**41**	P4.1	D31	29,80		26.70	b	32.40	b	**29,80**	2,85	9,56
15	**38**	P5.5	D31	32,00		21.00	b	32,00		**31,61**	6,35	20,09
16	**40**	P3.11	D31	32,20		31,90		30,60		**31,66**	0,85	2,68
17	**37a**	P9.1	D42	32.00	b	35,00		37,00		**35,00**	2,52	7,20
18	**26**	P5.1	D35	38,00		35.00	b	42.00	b	**38,00**	3,51	9,24
19	**27**	P6.1	D21	40,70		39,60		38,50		**39,60**	1,10	2,78
20	**23**	P3.3	D31	51.50	b	41.90	b	46,80		**46,80 ***	4,80	10,26
21	**30**	P6.5	D21.1	59,77		59,77		62,00		**60,16 ***	1,29	2,14
22	**8**	P3.2	D31	65,50		99.80	b	42.90	b	**65,50 ***	28,65	43,74
23	**54**	P3.2	D31	66,10		67,00		64,90		**66,10 ***	1,05	1,59
24	**25**	P5.1	D31	78.80	a	77.50	a	74.30	ab	**77,50 ***	2,32	2,99
25	**43**	P4.1	D31	85.90	a	85.20	a	94.60	ab	**85,94 ***	5,24	6,10
26	**9**	P5.5	D31	108.10	ab	90.90	a	80.60	ab	**90,90 ***	13,89	15,28
27	**5**	P21	D28	110.00	a	115.00	ab	95.00	ab	**110,00 ***	10,41	9,46
28	**55a**	P9.1	D42	220.00	ab	160.00	a	140.00	ab	**160,00 ***	41,63	26,02

Mean	Interlab.std. deviation	
	abs.	rel.%
35,02	**4,95**	**8,09**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **53,6**
Mean of 3rd Needle/Leaf Test 97/98 Sample 2: **34,27**

ICP-Forests 5th needle/leaf labtest 01/02

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**	P5.2	D31	52,00		49.90	b	52,90		**52,00**		1,54	2,96
2	**41**	P4.1	D31	56,70		55,80		49.60	b	**55,80**		3,87	6,94
3	**47**	P4.1	D32	56,90		57,00		56,20		**56,70**		0,44	0,78
4	**45**	P5.5	D31	58,00		58,00		61.00	b	**58,44**		1,73	2,96
5	**12**	P5.1	D31	60,40		60,00		59,50		**59,97**		0,45	0,75
6	**18**	P6.4	D31	60,80		58,80		60,80		**60,36**		1,15	1,91
7	**52**	P4.1	D31	63.20	b	60,10		60,00		**60,49**		1,82	3,01
8	**37a**	P9.1	D42	61,00		60,00		62,00		**61,00**		1,00	1,64
9	**50**	P4.1	D31	61,20		61,70		62,20		**61,70**		0,50	0,81
10	**38**	P5.5	D31	63,00		63,00		74.00	b	**63,44**		6,35	10,01
11	**37**	P5.1	D35	63,60		64,00		63,10		**63,57**		0,45	0,71
12	**20**	P5.1	D31	62.90	b	66,90		65,70		**65,70**		2,05	3,12
13	**26**	P5.1	D35	66,00		79.00	b	63.00	b	**66,00**		8,50	12,88
14	**42**	P4.1	D31	67,00		66,00		66,00		**66,33**		0,58	0,87
15	**2**	P5.3	D31	67,90		68,40		68,20		**68,17**		0,25	0,37
16	**55**	P5.5	D31	64.80	b	68,70		68,60		**68,21**		2,22	3,25
17	**33**	P5.1	D21	68,30		68,50		68,20		**68,33**		0,15	0,22
18	**4**	P5.1	D21.1	69,00		69,30		65.00	b	**68,71**		2,40	3,49
19	**40**	P3.11	D31	72.20	b	74,80		75,30		**74,61**		1,66	2,22
20	**23**	P3.3	D31	69.00	b	76,10		76,60		**75,91**		4,25	5,60
21	**30**	P6.5	D21.1	77,70		77,10		74.30	b	**76,96**		1,81	2,35
22	**27**	P6.1	D21	78,10		84.50	b	78,70		**78,84**		3,53	4,48
23	**36**	P3.3	D28	80,30		82,00		80,10		**80,64**		1,04	1,29
24	**8**	P3.2	D31	81.40	b	84,10		103.00	b	**84,10**		11,77	14,00
25	**54**	P3.2	D31	85,40		87.10	b	83.20	b	**85,40**		1,96	2,30
26	**39**	P5.5	D31	97.50	ab	104.90	ab	100.70	a	**100,70**	*	3,71	3,68
27	**9**	P5.5	D31	115.40	a	115.00	a	122.90	ab	**115,64**	*	4,45	3,85
28	**25**	P5.1	D31	115.00	a	119.00	ab	116.00	a	**116,00**	*	2,08	1,79
29	**43**	P4.1	D31	122.60	ab	144.40	ab	128.80	a	**128,80**	*	11,23	8,72
30	**5**	P21	D28	140.00	a	140.00	a	140.00	a	**140,00**	*	0,00	0,00
31	**55a**	P9.1	D42	180.00	ab	190.00	a	200.00	ab	**190,00**	*	10,00	5,26

Mean	Interlab.std. deviation	
	abs.	rel.%
71,71	**3,00**	**3,62**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **19,4**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Na**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**16**	P5.5	D31	170.00	a	170.00	a	160.00	ab	**169,33**		5,77	3,41
2	**23**	P3.3	D31	196.80	b	175.00	b	180,80		**180,80**		11,29	6,24
3	**46**	P5.2	D31	186,60		185,20		181.60	b	**185,20**		2,58	1,39
4	**47**	P4.1	D32	192,00		191,70		192,00		**191,90**		0,17	0,09
5	**41**	P4.1	D31	195,20		217.40	b	193,30		**195,20**		13,40	6,86
6	**38a**	P9.1	D42	203,00		199,00		200,00		**200,17**		2,08	1,04
7	**52**	P4.1	D31	295.10	b	203,00		200,00		**203,00**		54,06	26,63
8	**45**	P5.5	D31	203,00		207,00		203,00		**203,67**		2,31	1,13
9	**20**	P5.1	D31	203,70		206,30		201,60		**203,70**		2,35	1,15
10	**50**	P4.1	D31	204,50		203,50		208,00		**204,67**		2,36	1,15
11	**54**	P3.2	D31	201.10	b	205,00		207,20		**205,00**		3,09	1,51
12	**18**	P6.4	D31	204,30		208,40		208,40		**207,73**		2,37	1,14
13	**55**	P5.5	D31	209,30		209,80		208,70		**209,27**		0,55	0,26
14	**37a**	P9.1	D42	210,00		212,00		210,00		**210,67**		1,15	0,55
15	**38**	P5.5	D31	212,00		212,00		201.00	b	**211,33**		6,35	3,00
16	**39**	P5.5	D31	206.80	b	212,10		228.80	b	**212,10**		11,48	5,41
17	**40**	P3.11	D31	217,10		211.80	b	215,30		**215,30**		2,70	1,25
18	**12**	P5.1	D31	212.10	b	216,70		217,10		**216,23**		2,78	1,29
19	**37**	P5.1	D35	219,50		217,00		218,20		**218,23**		1,25	0,57
20	**2**	P5.3	D31	222,20		226.70	b	221,60		**222,57**		2,79	1,25
21	**42**	P4.1	D31	225,00		224,00		216.00	b	**223,83**		4,93	2,20
22	**33**	P5.1	D21	227,40		226,50		227,10		**227,00**		0,46	0,20
23	**30**	P6.5	D21.1	228,10		233,45		231,20		**231,20**		2,69	1,16
24	**26**	P5.1	D35	239.00	b	220.00	b	235,00		**235,00**		10,02	4,26
25	**27**	P6.1	D21	241,30		242,90		241,30		**241,83**		0,92	0,38
26	**43**	P4.1	D31	253,00		252,50		252,70		**252,73**		0,25	0,10
27	**8**	P3.2	D31	271.00	b	244.00	b	255,00		**255,00**		13,58	5,33
28	**9**	P5.5	D31	263,00		263,00		263,00		**263,00**		0,00	0,00
29	**36**	P3.3	D28	264,00		264,40		260.00	b	**263,53**		2,43	0,92
30	**5**	P21	D28	295.00	ab	265.00	ab	275.00	a	**275,00**		15,28	5,56
31	**4**	P5.1	D21.1	278.40	a	277.10	a	272.90	ab	**277,08**		2,87	1,04
32	**25**	P5.1	D31	325.00	a	320.00	ab	336.00	ab	**325,00**	*	8,19	2,52
33	**55a**	P9.1	D42	360.00	ab	350.00	a	320.00	ab	**350,00**	*	20,82	5,95

Mean	Interlab.std. deviation	
	abs.	rel.%
220,70	**6,46**	**2,88**

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

*** =not tolerable mean because more than +/- 30 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **6,1**

ICP-Forests 5th needle/leaf labtest 01/02

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

No.	**Lab.code**	Method codes		Replications						**Lab.mean**		Lab.standard deviation	
		pretreatm.	determ.									abs.	rel.%
1	**55a**	P9.1	D42	34.00	a	37.00	a	32.00	a	**34,22**	*	2,52	7,36
2	**16**	P5.5	D31	42.70	a	41.00	a	38.10	a	**40,63**	*	2,33	5,73
3	**9**	P5.5	D31	53,40		60.90	b	53,20		**54,52**	*	4,39	8,05
4	**26**	P5.1	D31	56,60		53,50		56,50		**55,53**	*	1,76	3,17
5	**11**	P5.1	D31	58,50		54.40	b	63.50	b	**58,50**	*	4,56	7,79
6	**4**	P5.1	D31	59,80		60,40		51.10	b	**58,88**	*	5,20	8,83
7	**40**	P3.11	D31	60,20		64,10		61,90		**62,07**	*	1,96	3,16
8	**48**	P4.1	D31	66,40		67,40		69,40		**67,73**		1,53	2,26
9	**2**	P5.3	D31	66,00		73.00	b	68,00		**68,22**		3,61	5,29
10	**46**	P5.2	D31	76,90		73,70		72,10		**74,12**		2,44	3,29
11	**52**	P4.1	D31	76,30		76,10		76,20		**76,20**		0,10	0,13
12	**37**	P5.2	D35	78,40		79,60		79,90		**79,30**		0,79	1,00
13	**39**	P5.5	D31	82,20		79,70		78,00		**79,97**		2,11	2,64
14	**45**	P5.5	D31	83,00		78.00	b	83,00		**81,78**		2,89	3,53
15	**38**	P5.2	D31	88,00		83,50		85,30		**85,60**		2,26	2,64
16	**41**	P4.1	D31	86,50		85,80		86,30		**86,20**		0,36	0,42
17	**12**	P5.1	D31	86,30		84,50		95.70	b	**86,62**		6,01	6,94
18	**18**	P3.31	D31	105.80	b	80.10	b	86,90		**86,90**		13,32	15,33
19	**37a**	P9.1	D42	89,00		85,00		88,00		**87,33**		2,08	2,38
20	**43**			87,40		79.10	b	90,30		**87,40**		5,81	6,65
21	**25**	P5.1	D31	91,20		87,30		89,10		**89,20**		1,95	2,19
22	**42**	P4.1	D31	90,00		94,00		94,00		**92,78**		2,31	2,49
23	**54**	P3.2	D31	103,00		100,20		99,40		**100,87**	*	1,89	1,87
24	**8**	P3.2	D31	145.00	b	101,00		84.20	b	**101,00**	*	31,40	31,09
25	**23**	P3.3	D31	103,30		99.60	b	118.70	b	**103,30**	*	10,13	9,81
26	**47**	P4.1	D32	102,30		106,30		103,90		**104,17**	*	2,01	1,93

Mean	Interlab.std. deviation	
	abs.	rel.%
78,07	**4,45**	**5,61**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **42,3**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Al**
Dimension: **µg/g**
Sample: **2** **SPRUCE NEEDLES (Norway)** =Pine Needles (Finland), sample 2 of 3rd Needle/Leaf Test 97/98

No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**55a**	P9.1	D42	242.00	ab	233.00	a	204.00	ab	**233,00**	19,86	8,52
2	**25**	P5.1	D31	246.00	a	243.00	a	251.00	a	**246,50**	4,04	1,64
3	**40**	P3.11	D31	252.20	a	249.70	a	256.40	a	**252,77**	3,39	1,34
4	**16**	P5.5	D31	246.00	b	255,00		256,00		**253,50**	5,51	2,17
5	**46**	P5.2	D31	259,40		227.60	b	261,20		**258,30**	18,90	7,32
6	**9**	P5.5	D31	267,50		276.20	b	261,90		**267,50**	7,21	2,70
7	**52**	P4.1	D31	270,00		269,50		262,80		**267,75**	4,02	1,50
8	**37a**	P9.1	D42	265,00		270,00		271,00		**268,67**	3,21	1,19
9	**4a**	P9.1	D41	300.10	b	264.60	b	280,00		**280,00**	17,80	6,36
10	**45**	P5.5	D31	280,00		280,00		280,00		**280,00**	0,00	0,00
11	**37**	P5.2	D35	285,00		280,50		278,60		**281,37**	3,29	1,17
12	**11**	P5.1	D31	284,70		282,30		281,90		**282,97**	1,51	0,53
13	**38**	P5.2	D31	295.80	b	275.10	b	283,50		**283,50**	10,41	3,67
14	**23**	P3.3	D31	284,10		290,10		271.60	b	**284,10**	9,44	3,32
15	**39**	P5.5	D31	289,50		283,90		287,40		**286,93**	2,83	0,99
16	**54**	P3.2	D31	288,30		285,60		290,10		**288,00**	2,26	0,78
17	**48**	P4.1	D31	286,00		290,30		297.20	b	**290,30**	5,65	1,95
18	**18**	P3.31	D31	292,90		303.70	b	269.20	b	**292,90**	17,65	6,03
19	**4**	P5.1	D31	294,30		285.50	b	297,60		**293,95**	6,25	2,13
20	**43**			296,70		287.60	b	297,20		**294,95**	5,40	1,83
21	**41**	P4.1	D31	295,60		295,00		295,60		**295,40**	0,35	0,12
22	**47**	P4.1	D32	298,10		292,90		297,40		**296,13**	2,82	0,95
23	**8**	P3.2	D31	301,00		287.00	b	308.00	b	**301,00**	10,69	3,55
24	**2**	P5.3	D31	299,00		305,00		303,00		**302,33**	3,06	1,01
25	**26**	P5.1	D31	302,60		308,00		302,00		**304,20**	3,30	1,08
26	**12**	P5.1	D31	311,50		311,50		292.20	b	**309,50**	11,14	3,60
27	**42**	P4.1	D31	325.00	a	320.00	a	323.00	a	**322,67**	2,52	0,78

Mean	Interlab.std. deviation	
	abs.	rel.%
283,20	**6,76**	**2,45**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **0,0**
Mean of 3rd Needle/Leaf Test 97/98 sample 2: **293,20**

ICP-Forests 5th needle/leaf labtest 01/02

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	**4a**	P9.1	D41	88.70	ab	61.20	ab	69.20	a	**69,20**	*	14,15	20,45
2	**16**	P5.5	D31	97.90	ab	105.00	a	117.00	ab	**105,00**	*	9,65	9,19
3	**46**	P5.2	D31	116,20		118,50		124.60	b	**118,50**		4,34	3,66
4	**9**	P5.5	D31	122,90		120,50		137.00	b	**122,90**		8,91	7,25
5	**55a**	P9.1	D42	123,00		119.00	b	127.00	b	**123,00**		4,00	3,25
6	**26**	P5.1	D31	123,00		124,00		130.00	b	**124,61**		3,79	3,04
7	**11**	P5.1	D31	123,00		127,70		125,20		**125,21**		2,35	1,88
8	**25**	P5.1	D31	124,00		129,00		128,00		**127,39**		2,65	2,08
9	**40**	P3.11	D31	139.90	b	135,20		128.40	b	**135,20**		5,78	4,28
10	**48**	P4.1	D31	134,00		136,10		139,50		**136,16**		2,78	2,04
11	**52**	P4.1	D31	138,00		136,10		135,60		**136,57**		1,27	0,93
12	**37a**	P9.1	D42	138,00		139,00		138,00		**138,33**		0,58	0,42
13	**2**	P5.3	D31	140,00		139,00		137,00		**138,67**		1,53	1,10
14	**38**	P5.2	D31	139,10		143.10	b	136,30		**139,10**		3,42	2,46
15	**4**	P5.1	D31	126.40	b	139,30		142,80		**139,30**		8,64	6,20
16	**37**	P5.2	D35	140,90		140,10		139,30		**140,10**		0,80	0,57
17	**45**	P5.5	D31	144,00		143,00		147,00		**144,61**		2,08	1,44
18	**43**			149,10		142,20		146,00		**146,00**		3,46	2,37
19	**41**	P4.1	D31	147,10		147,90		147,80		**147,60**		0,44	0,30
20	**23**	P3.3	D31	147,10		155.90	b	146,00		**147,66**		5,43	3,68
21	**39**	P5.5	D31	151,10		147,60		147,30		**148,56**		2,11	1,42
22	**54**	P3.2	D31	151,00		148,60		149,90		**149,83**		1,20	0,80
23	**12**	P5.1	D31	152,20		167.60	b	151,80		**153,11**		9,01	5,88
24	**18**	P3.31	D31	164.40	b	155,20		149.50	b	**155,20**		7,52	4,85
25	**8**	P3.2	D31	156,00		157,00		150.00	b	**155,39**		3,79	2,44
26	**42**	P4.1	D31	163,00		161,00		161,00		**161,67**		1,15	0,71
27	**47**	P4.1	D32	160,40		160,90		164,10		**161,76**		2,01	1,24

Mean	Interlab.std. deviation	
	abs.	rel.%
138,70	**4,18**	**3,48**

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

*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

Annotation: Percentage of non-tolerable lab means: **7,4**

ICP-Forests 5th needle/leaf labtest 01/02

Element: **Al**
Dimension: **µg/g**
Sample: **4** **PINE NEEDLES (Germany)**

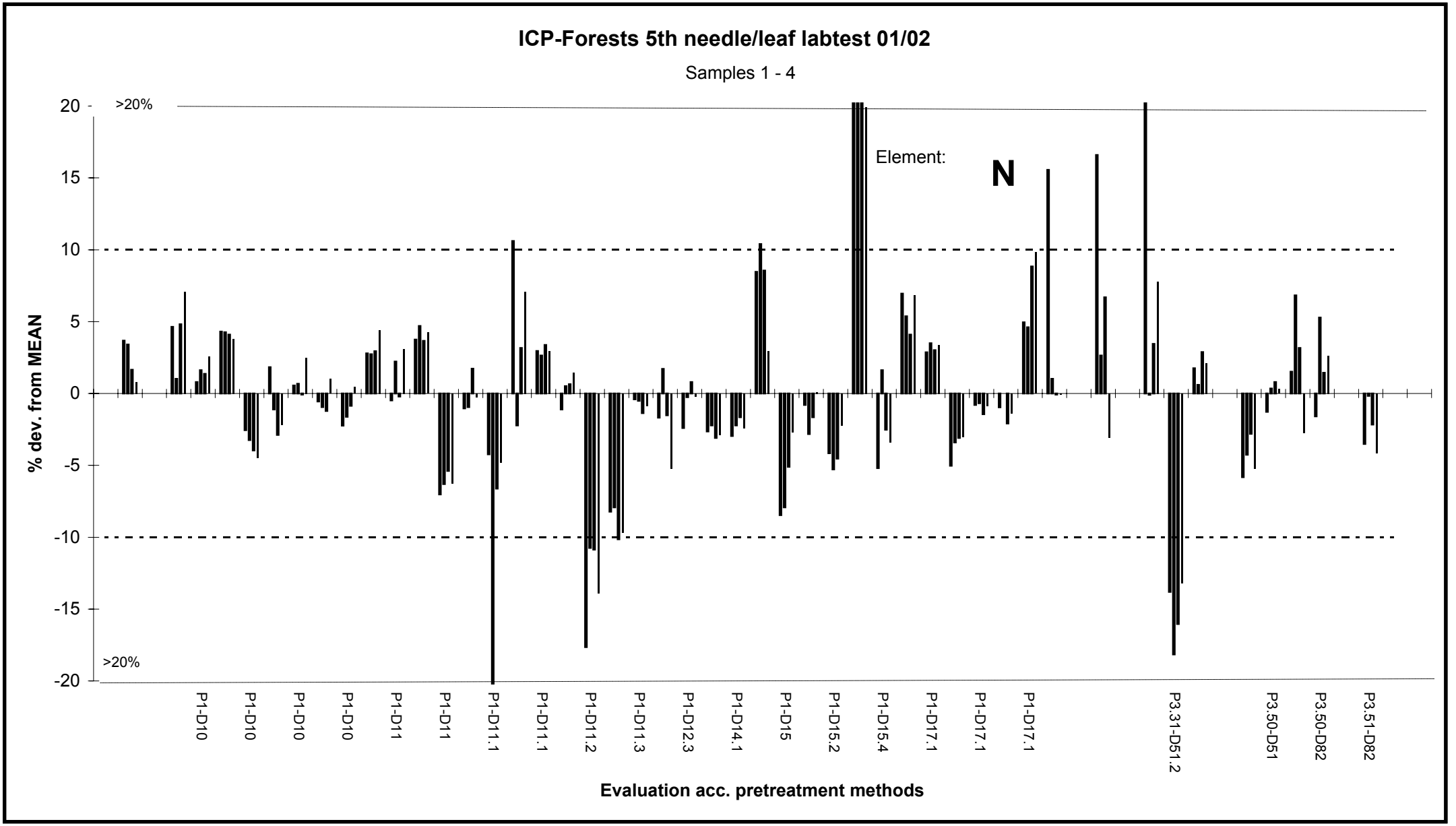
No.	**Lab.code**	Method codes		Replications						**Lab.mean**	Lab.standard deviation	
		pretreatm.	determ.								abs.	rel.%
1	**4a**	P9.1	D41	171.20	a	183.40	ab	165.70	ab	**171,20 ***	9,06	5,29
2	**43**			183.80	a	186.80	a	184.00	a	**184,87**	1,68	0,91
3	**46**	P5.2	D31	186.40	a	200.50	ab	189.50	a	**189,50**	7,41	3,91
4	**16**	P5.5	D31	189.00	a	190.00	a	190.00	a	**189,67**	0,58	0,31
5	**40**	P3.11	D31	196,20		192,70		194,10		**194,33**	1,76	0,91
6	**25**	P5.1	D31	202,00		208.00	b	202,00		**203,22**	3,46	1,70
7	**55a**	P9.1	D42	209,00		210,00		204.00	b	**208,28**	3,21	1,54
8	**37a**	P9.1	D42	210,00		210,00		212,00		**210,67**	1,15	0,55
9	**38**	P5.2	D31	215.40	b	211,50		209,90		**211,92**	2,83	1,34
10	**9**	P5.5	D31	203.40	b	214,10		216,30		**213,98**	6,90	3,22
11	**54**	P3.2	D31	221,30		217,40		219,60		**219,43**	1,96	0,89
12	**52**	P4.1	D31	220,00		221,00		218,20		**219,73**	1,42	0,65
13	**11**	P5.1	D31	222,70		221,60		225,00		**223,10**	1,73	0,78
14	**4**	P5.1	D31	226,10		221.70	b	232.90	b	**226,10**	5,64	2,49
15	**45**	P5.5	D31	227,00		225,00		227,00		**226,33**	1,15	0,51
16	**18**	P3.31	D31	228,50		225,50		226,90		**226,97**	1,50	0,66
17	**48**	P4.1	D31	222.30	b	227,50		231.70	b	**227,50**	4,71	2,07
18	**37**	P5.2	D35	230,10		228,00		228,80		**228,97**	1,06	0,46
19	**41**	P4.1	D31	226,20		232.90	b	229,10		**229,10**	3,36	1,47
20	**39**	P5.5	D31	229,10		228,80		229,60		**229,17**	0,40	0,17
21	**26**	P5.1	D31	231,00		228,00		230,00		**229,67**	1,53	0,67
22	**8**	P3.2	D31	227.00	b	238.00	b	231,00		**231,00**	5,57	2,41
23	**2**	P5.3	D31	238,00		240,00		236,00		**238,00**	2,00	0,84
24	**23**	P3.3	D31	252.10	b	216.80	b	240,80		**240,80**	18,03	7,49
25	**47**	P4.1	D32	243,10		241,20		239,30		**241,20**	1,90	0,79
26	**42**	P4.1	D31	249,00		252,00		249,00		**250,00**	1,73	0,69
27	**12**	P5.1	D31	248.60	a	254.80	ab	250.60	a	**250,82**	3,16	1,26

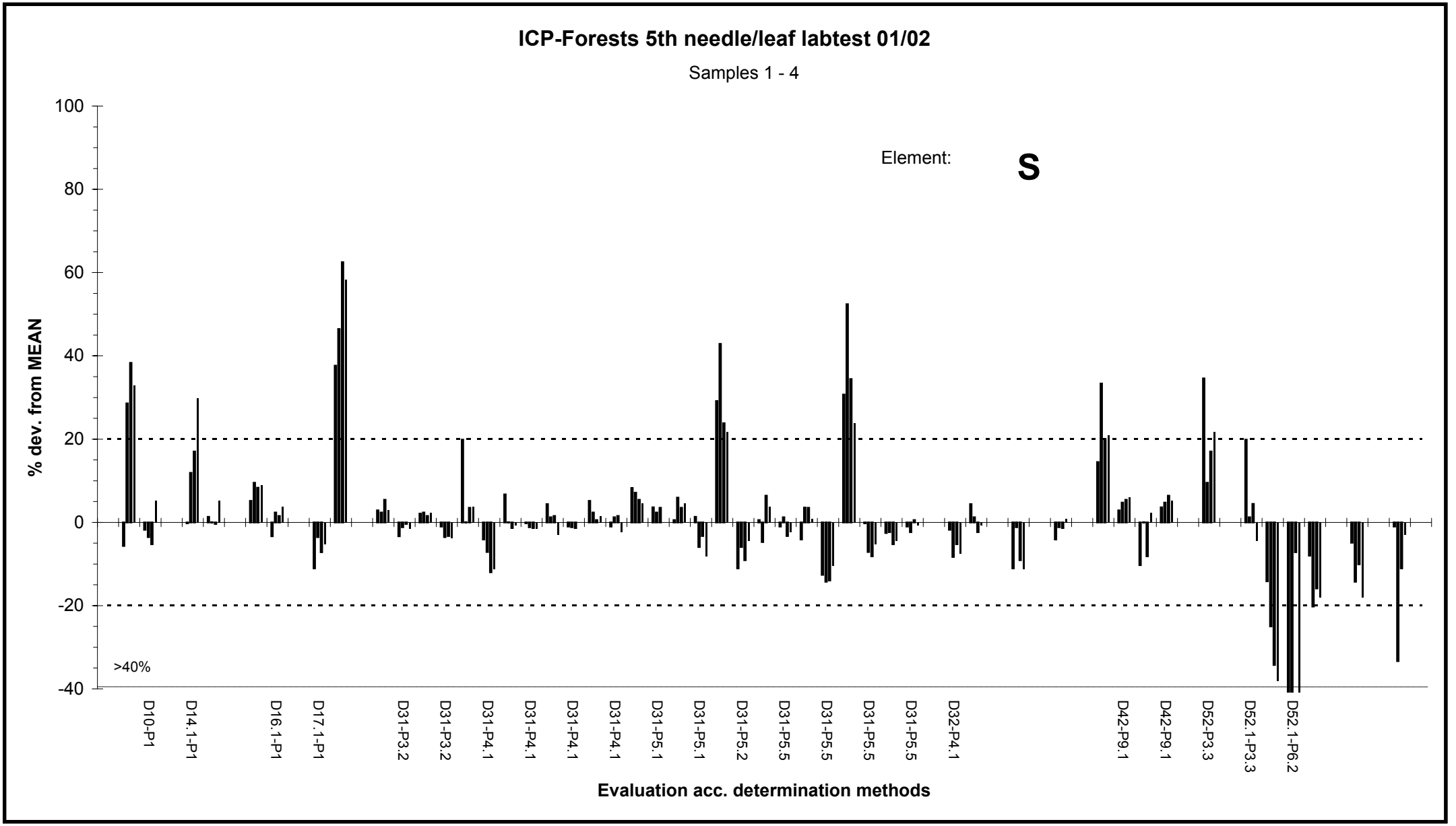
Mean	Interlab.std. deviation	
	abs.	rel.%
220,30	**3,51**	**1,63**

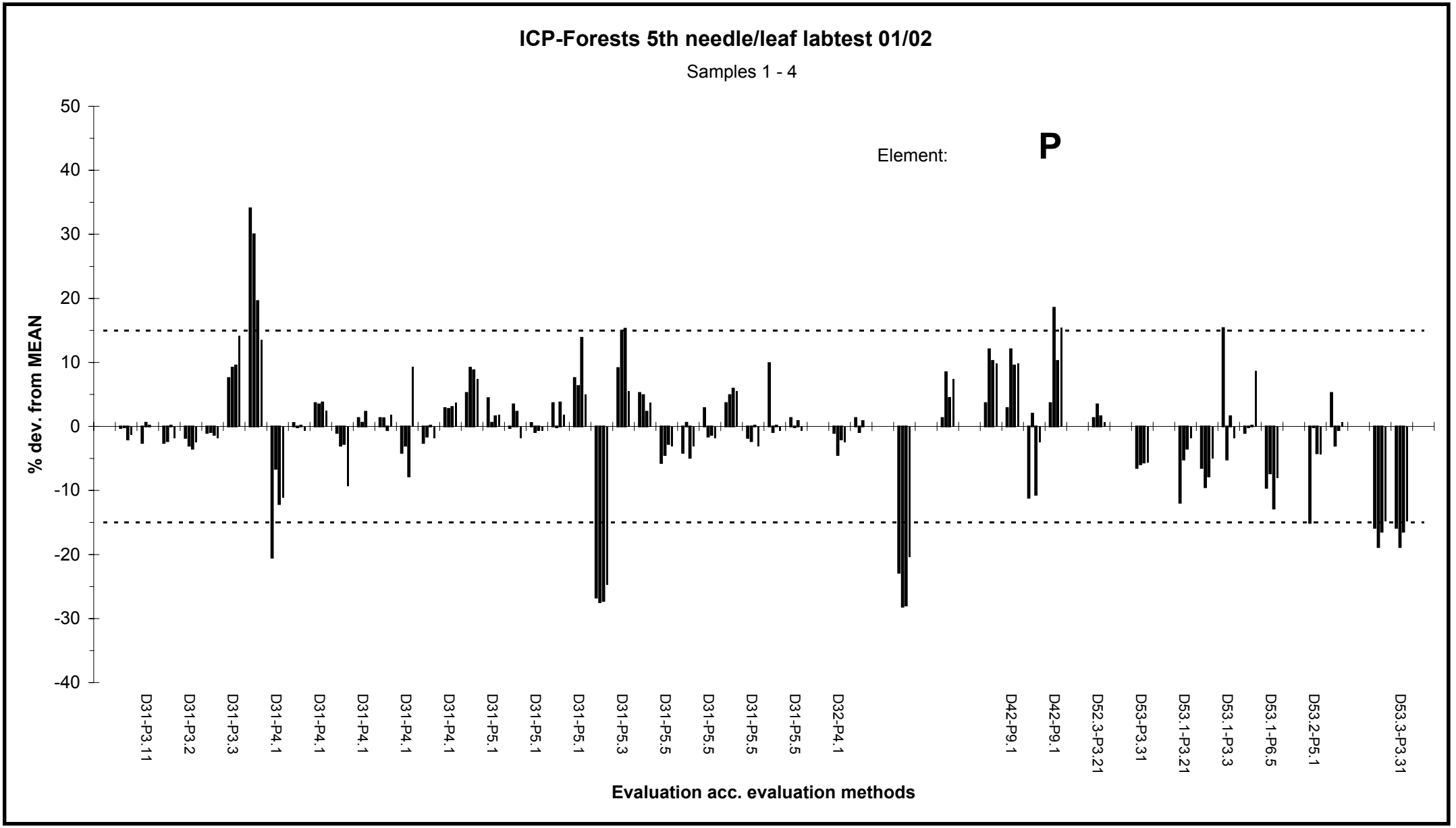
a = lab.mean is trimmed
b = trimmed single value

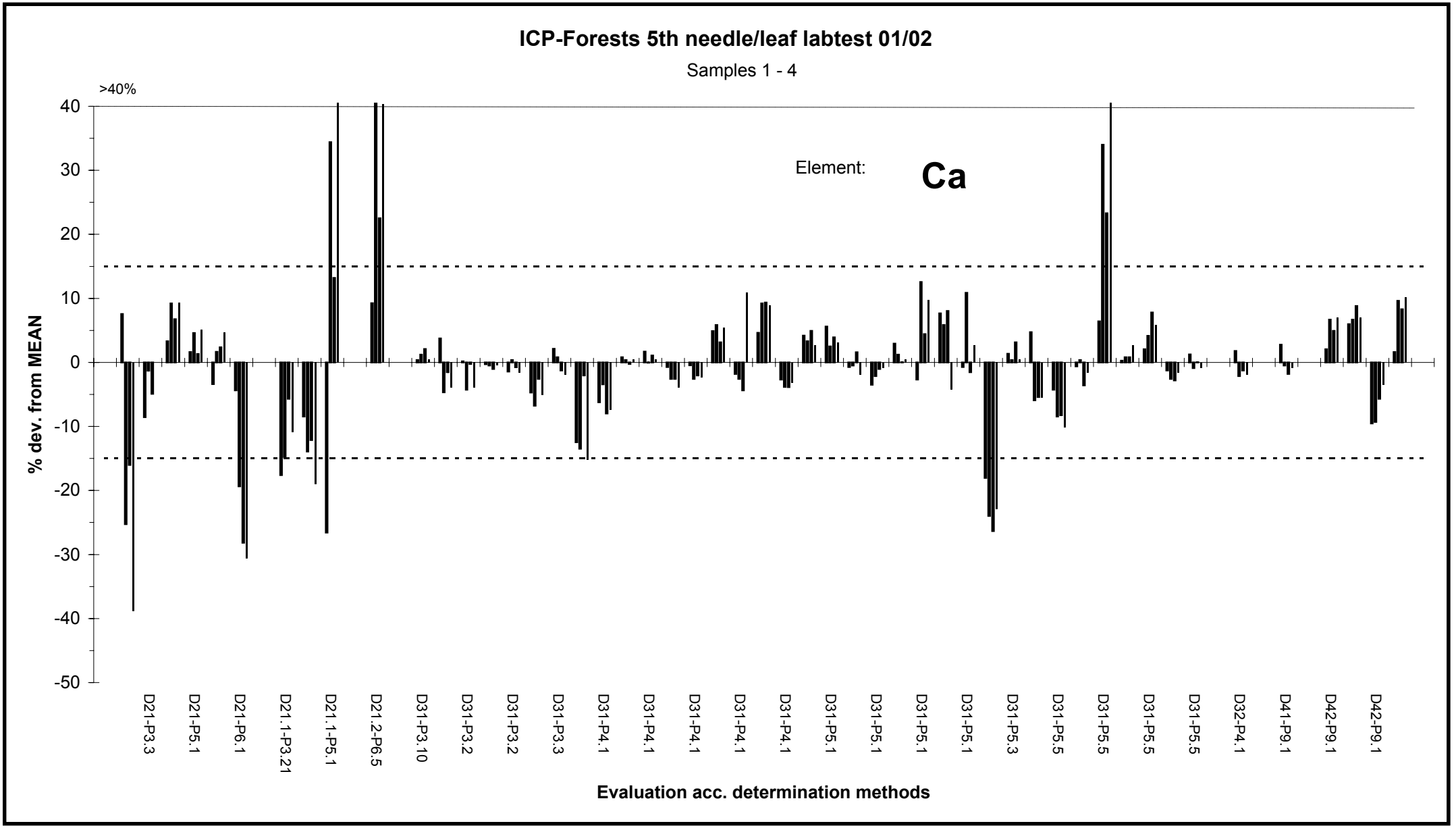
*** =not tolerable mean because more than +/- 20 % from mean (Agreement from Bonn 1999)**

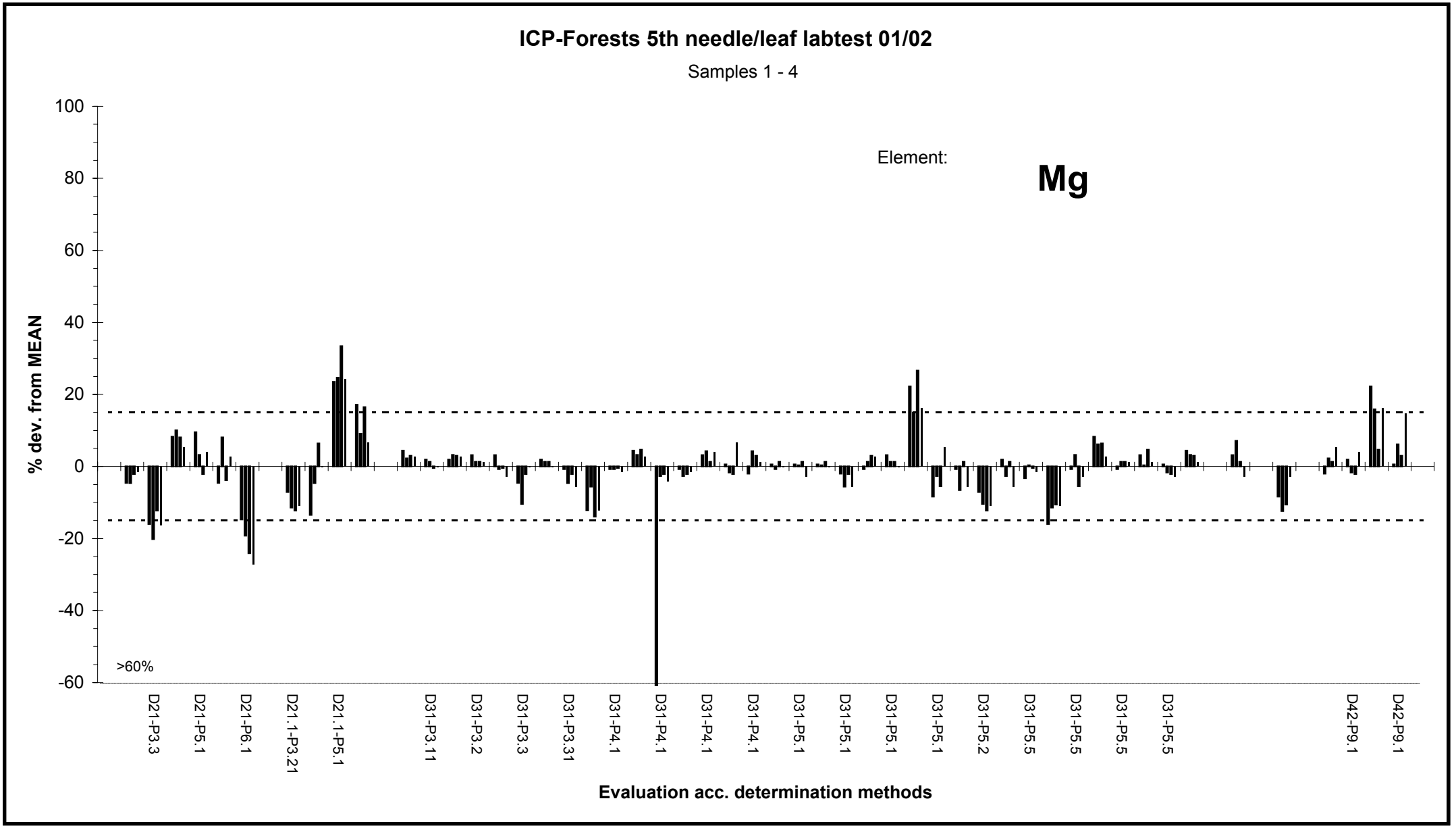
Annotation: Percentage of non-tolerable lab means: **3,7**

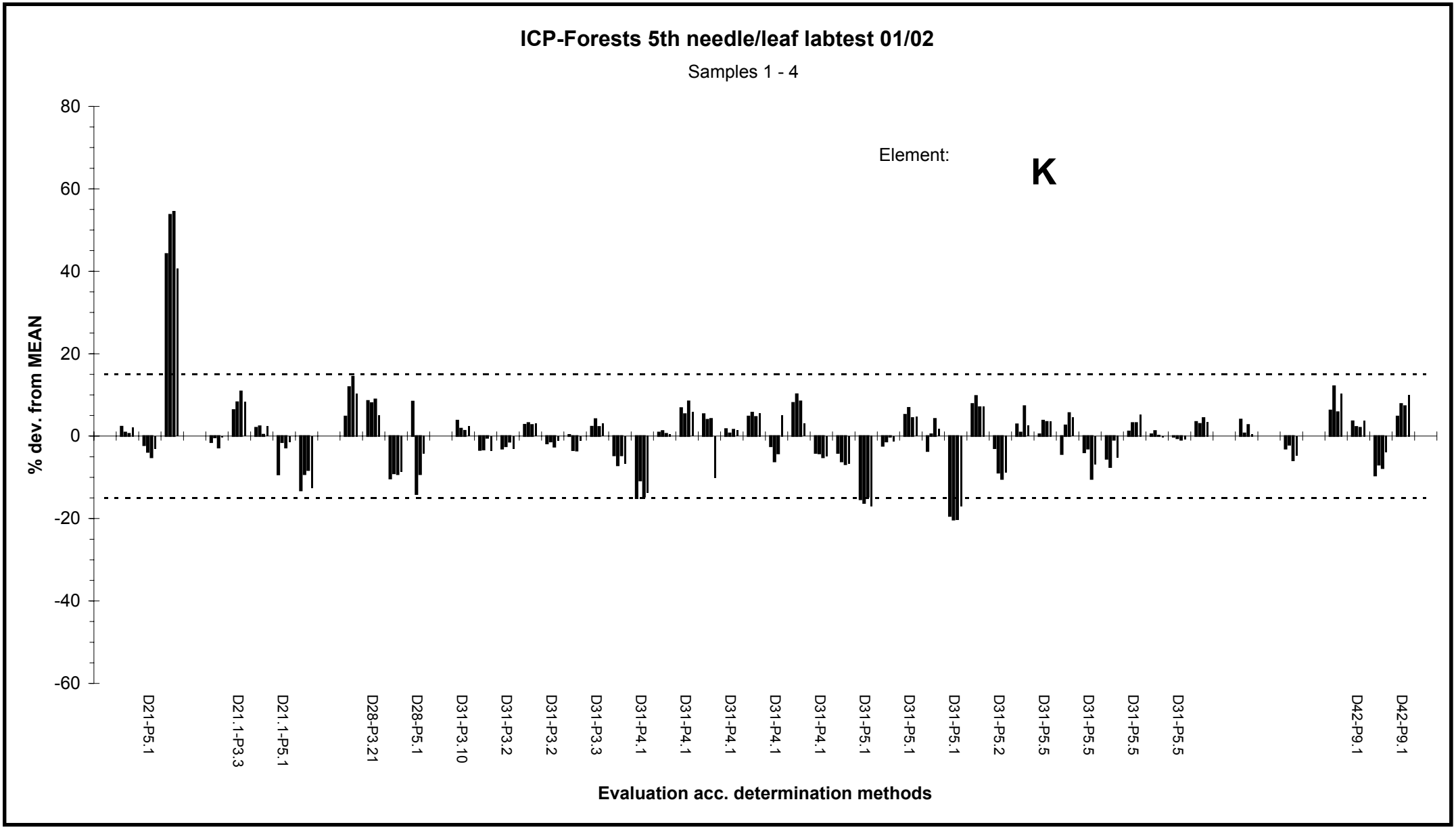

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
N
>20%
>20%
20
15
10
5
0
-5
-10
-15
-20
% dev. from MEAN
P1-D10
P1-D10
P1-D10
P1-D10
P1-D11
P1-D11
P1-D11.1
P1-D11.1
P1-D11.2
P1-D11.3
P1-D12.3
P1-D14.1
P1-D15
P1-D15.2
P1-D15.4
P1-D17.1
P1-D17.1
P1-D17.1
P3.31-D51.2
P3.50-D51
P3.50-D82
P3.51-D82
Evaluation acc. pretreatment methods

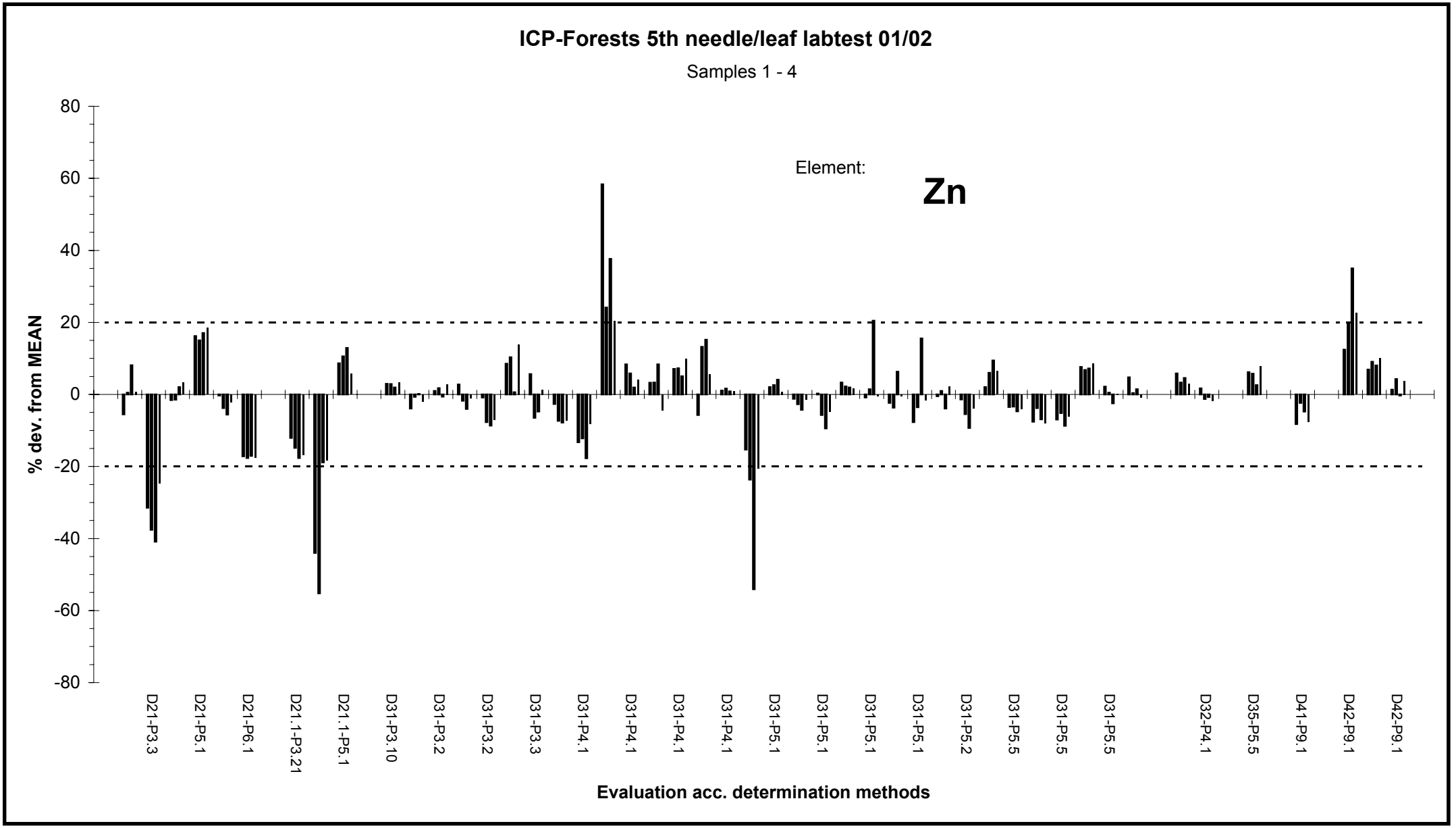

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
S
100
80
60
40
20
0
-20
-40
% dev. from MEAN
>40%
D10-P1
D14.1-P1
D16.1-P1
D17.1-P1
D31-P3.2
D31-P3.2
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D42-P9.1
D42-P9.1
D52-P3.3
D52.1-P3.3
D52.1-P6.2
Evaluation acc. determination methods

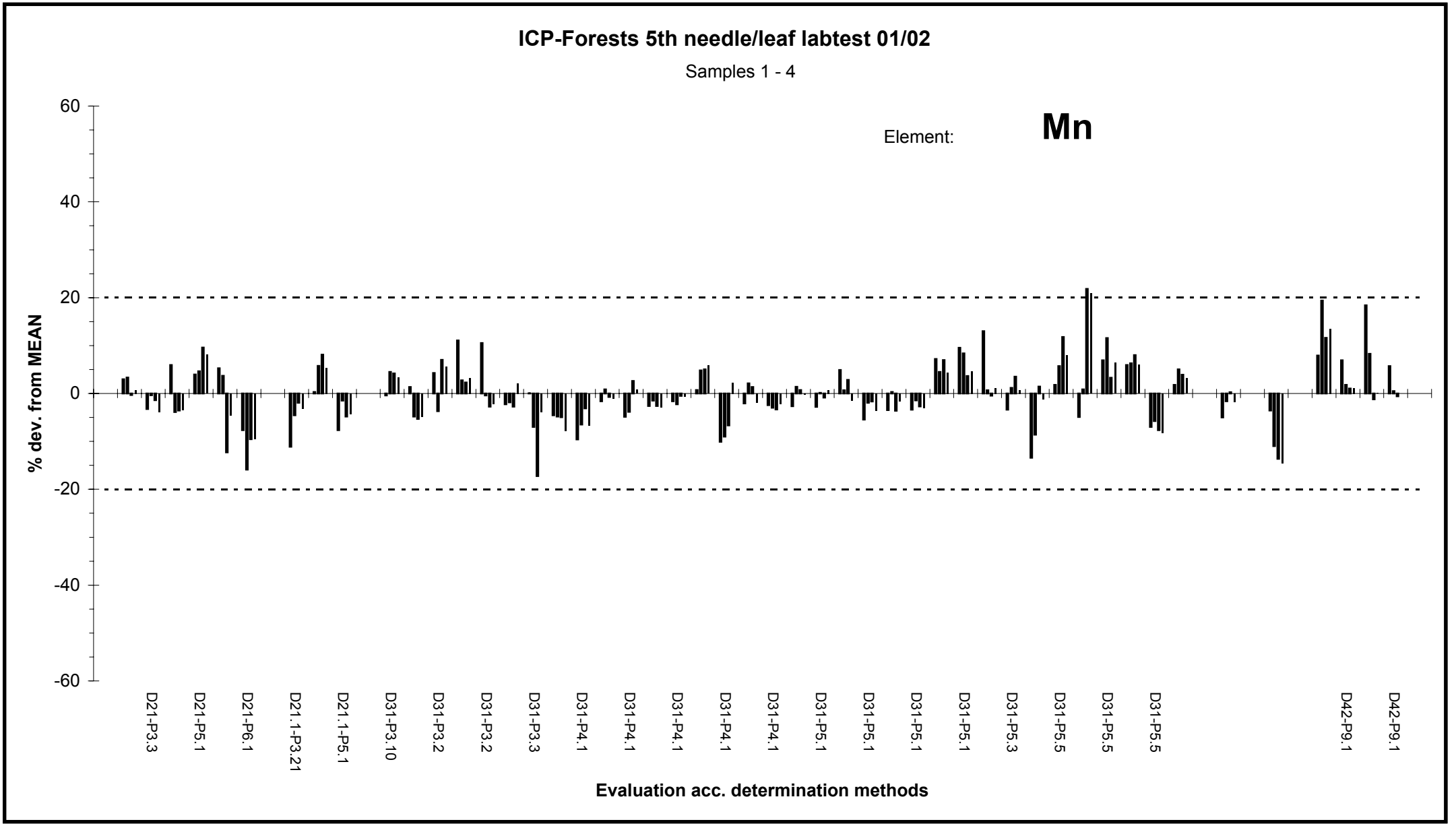

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: P
% dev. from MEAN
50
40
30
20
10
0
-10
-20
-30
-40
D31-P3.11
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D42-P9.1
D42-P9.1
D52.3-P3.21
D53-P3.31
D53.1-P3.21
D53.1-P3.3
D53.1-P6.5
D53.2-P5.1
D53.3-P3.31
Evaluation acc. evaluation methods

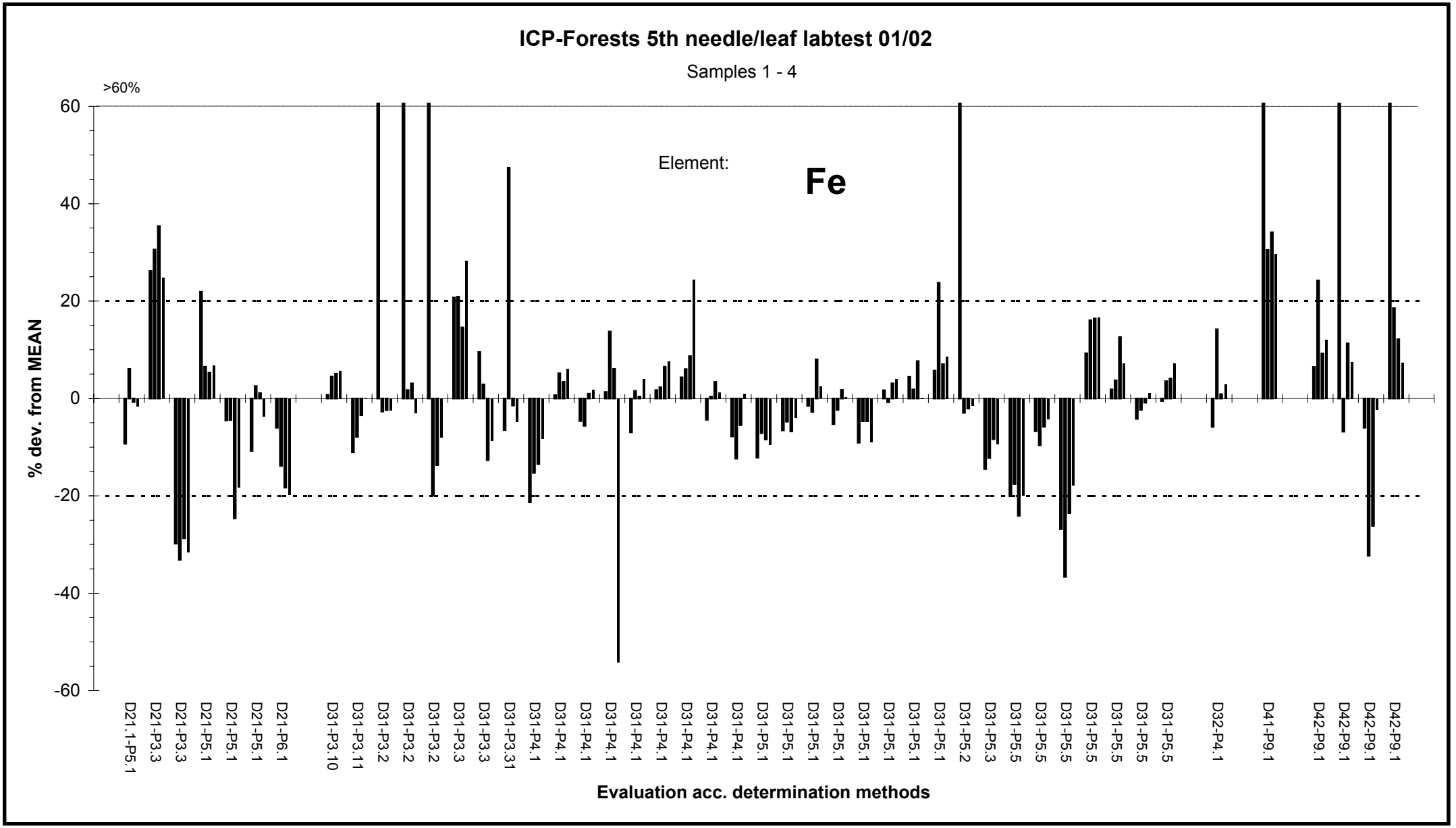

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
>40%
Element:
Ca
% dev. from MEAN
40
30
20
10
0
-10
-20
-30
-40
-50
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D21.2-P6.5
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

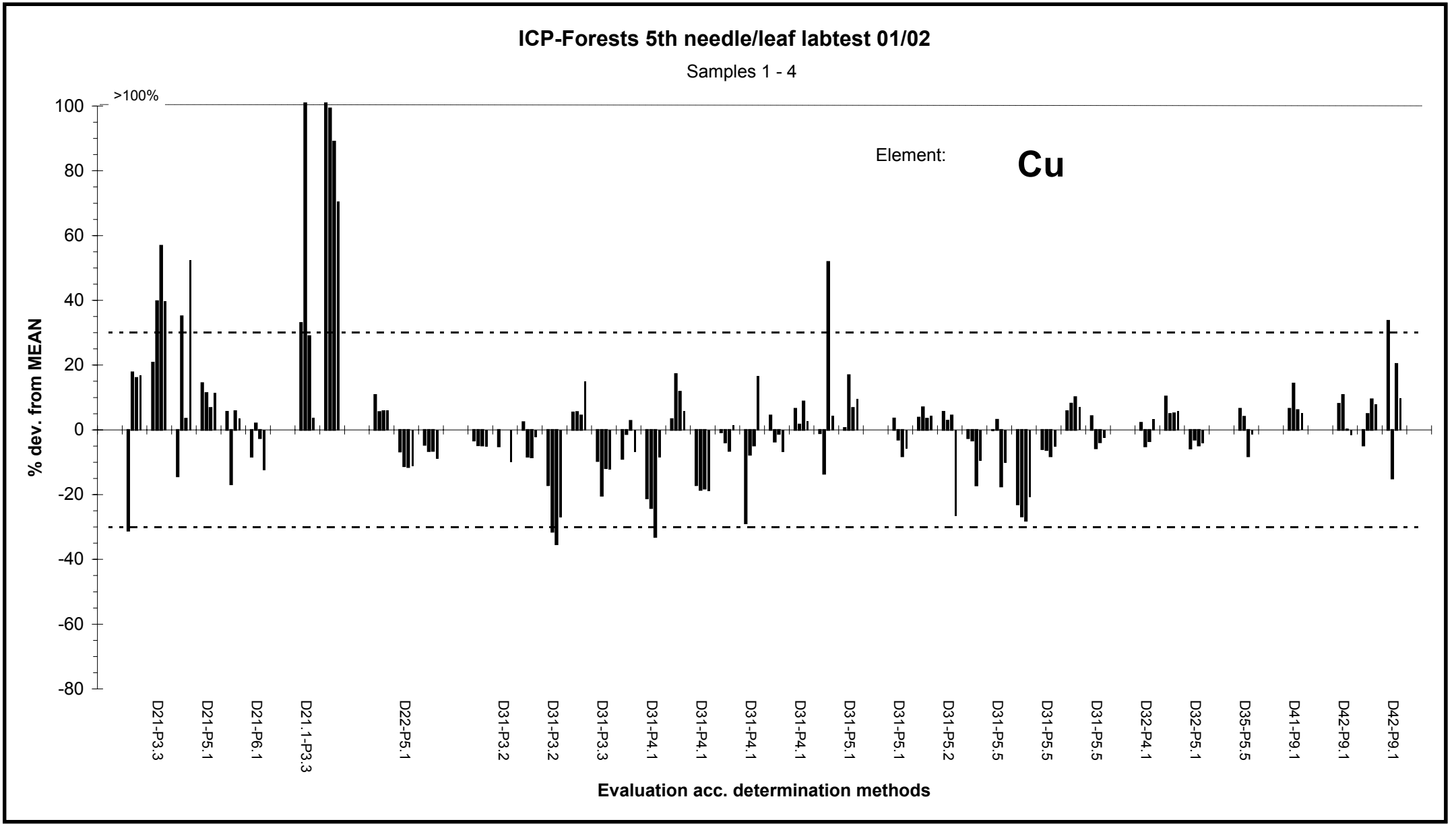

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Mg
100
80
60
40
20
0
-20
-40
-60
% dev. from MEAN
>60%
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.11
D31-P3.2
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

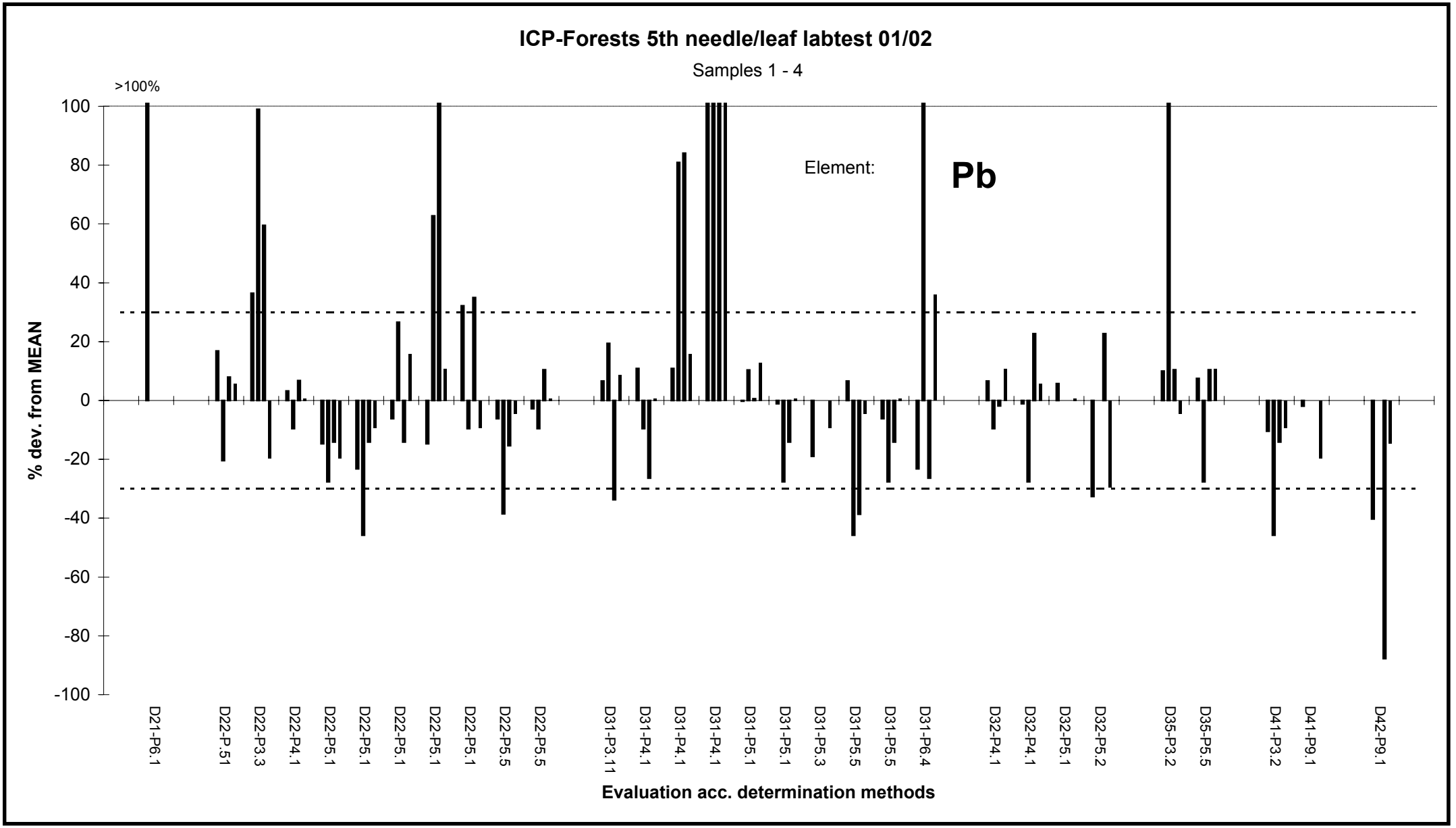

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
K
80
60
40
20
0
-20
-40
-60
% dev. from MEAN
D21-P5.1
D21.1-P3.3
D21.1-P5.1
D28-P3.21
D28-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

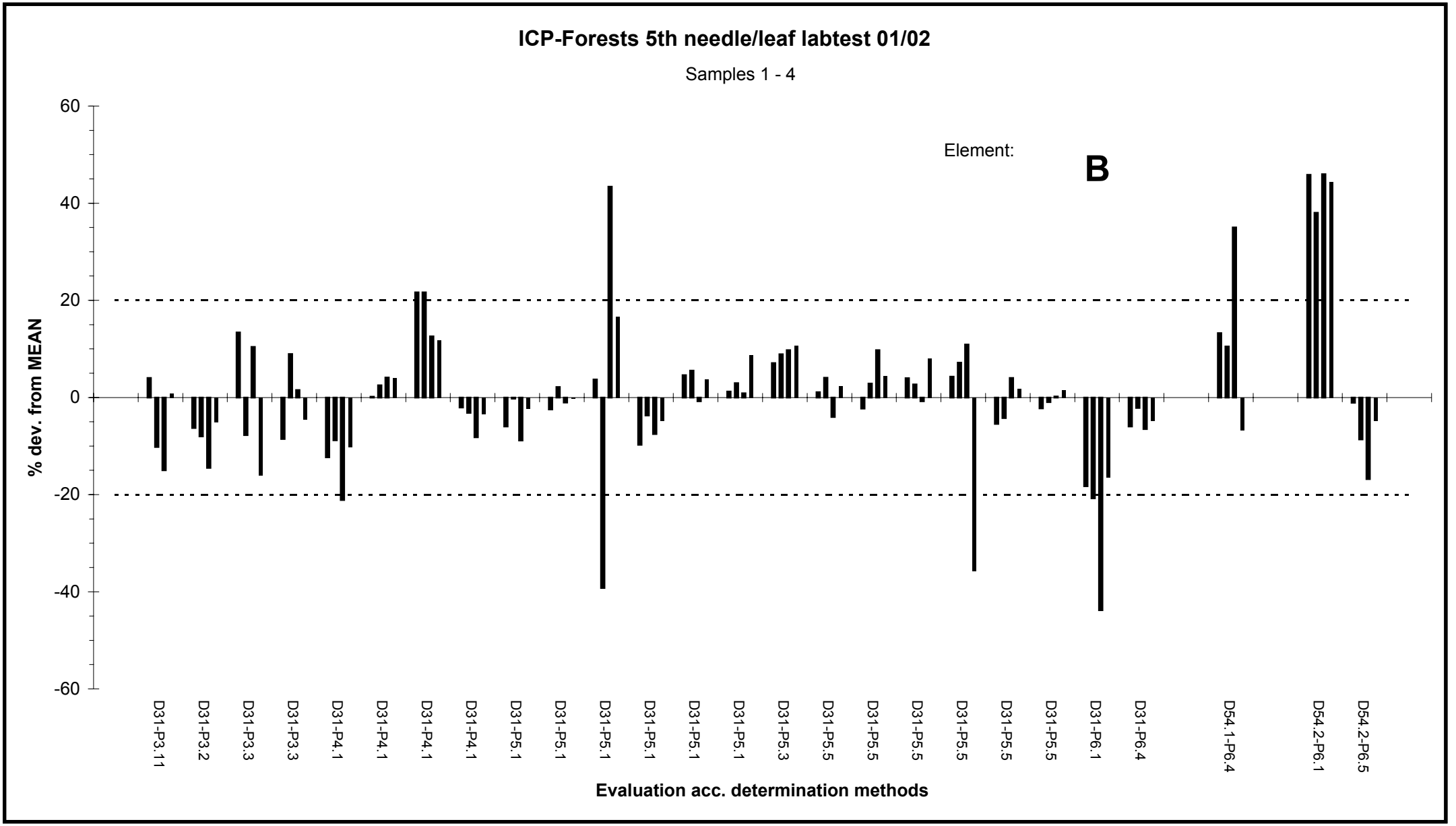

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Zn
% dev. from MEAN
80
60
40
20
0
-20
-40
-60
-80
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D35-P5.5
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

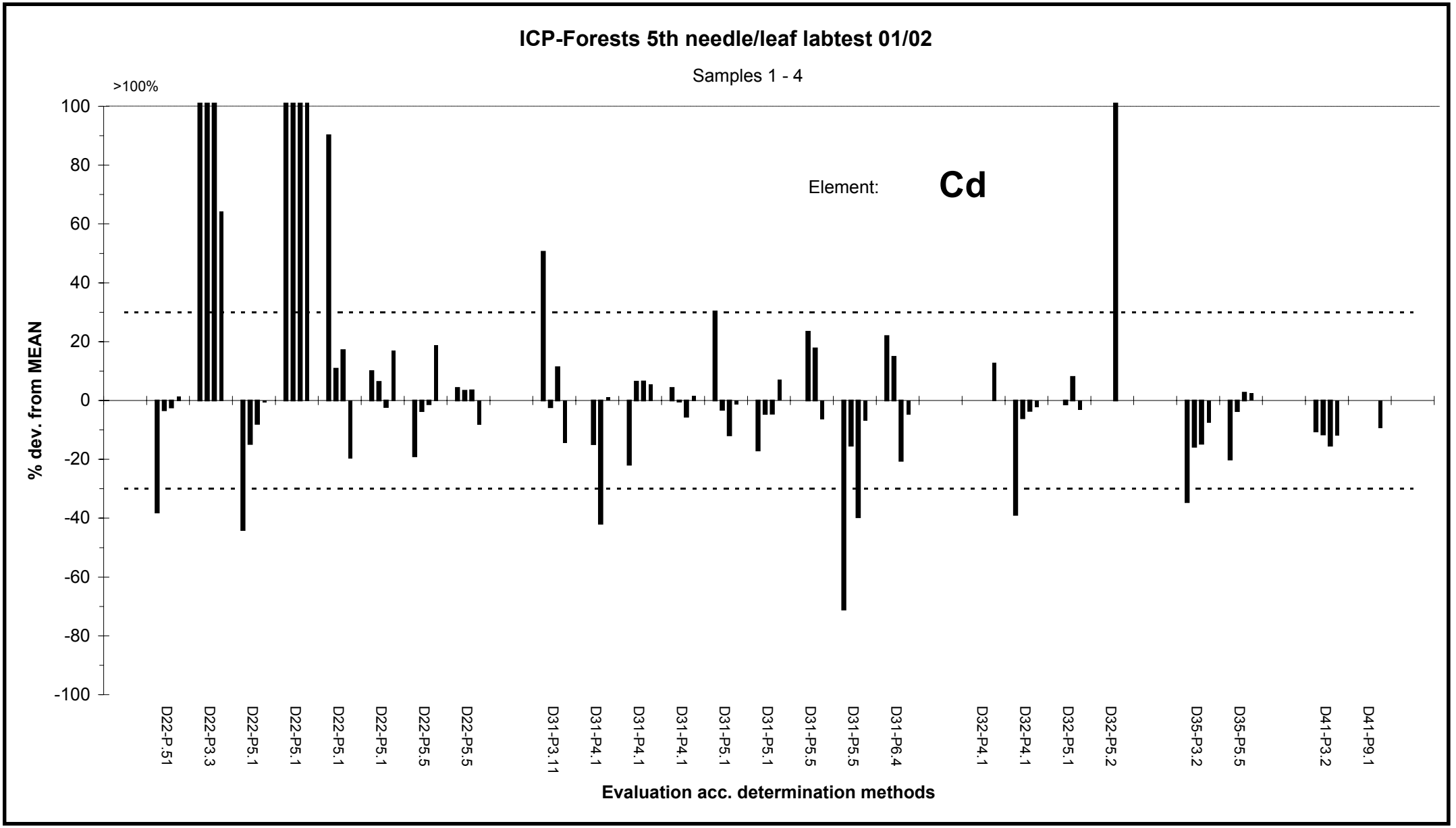

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Mn
60
40
20
0
-20
-40
-60
% dev. from MEAN
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

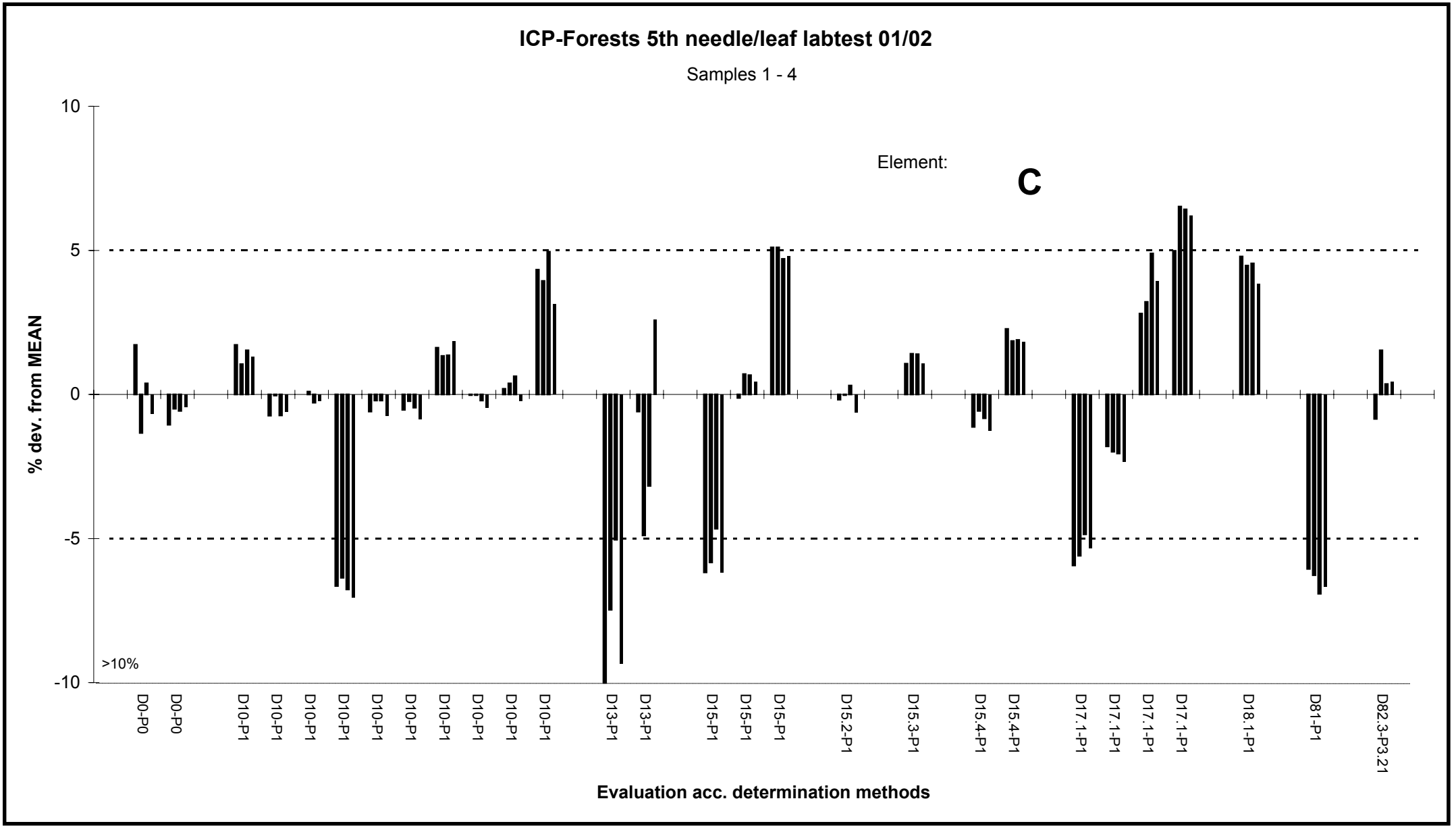

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
>60%
Element:
Fe
% dev. from MEAN
60
40
20
0
-20
-40
-60
D21.1-P5.1
D21-P3.3
D21-P3.3
D21-P5.1
D21-P5.1
D21-P5.1
D21-P6.1
D31-P3.10
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.2
D31-P3.3
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D41-P9.1
D42-P9.1
D42-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

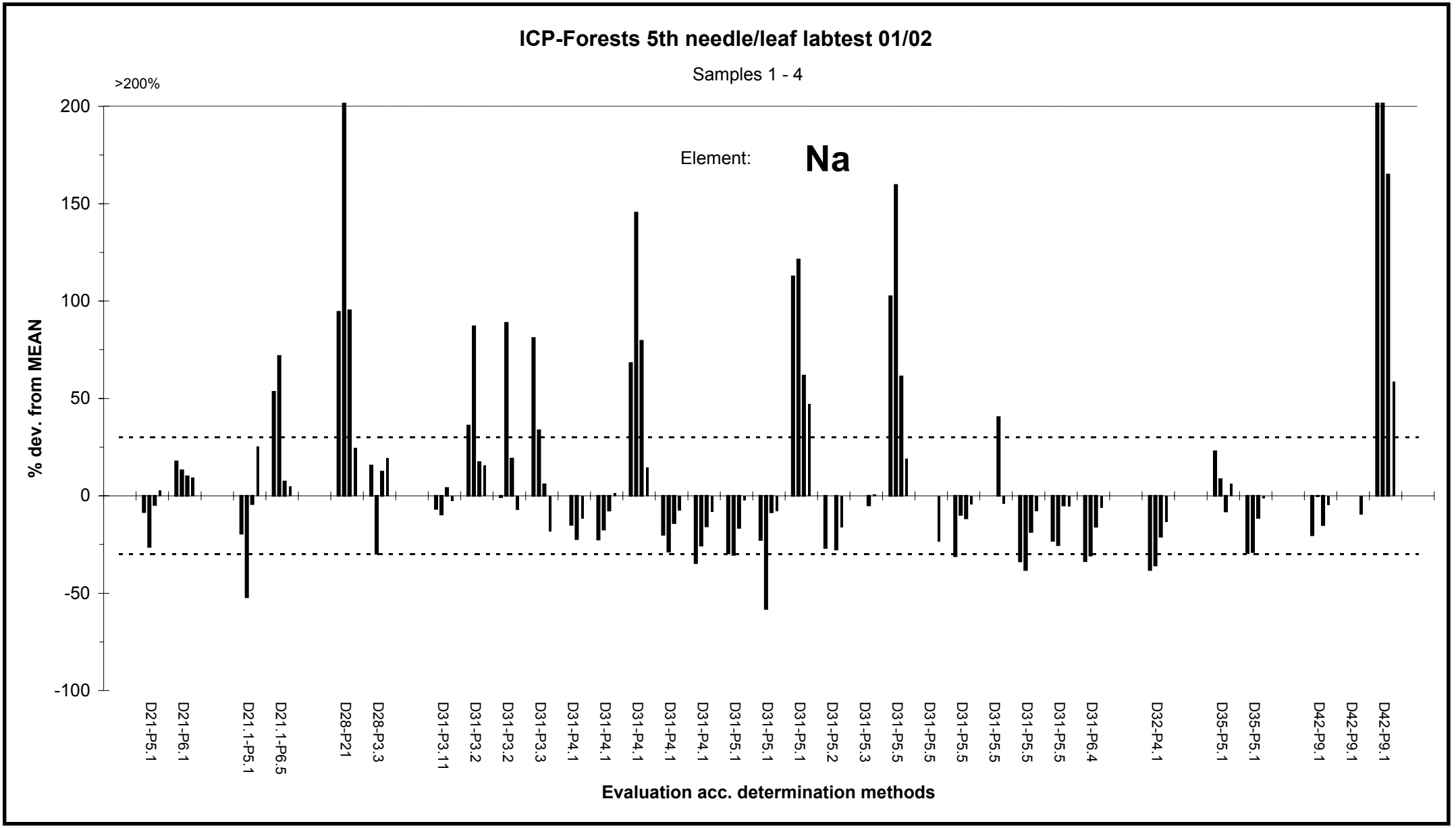

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Cu
>100%
100
80
60
40
20
0
-20
-40
-60
-80
% dev. from MEAN
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.3
D22-P5.1
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D32-P5.1
D35-P5.5
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

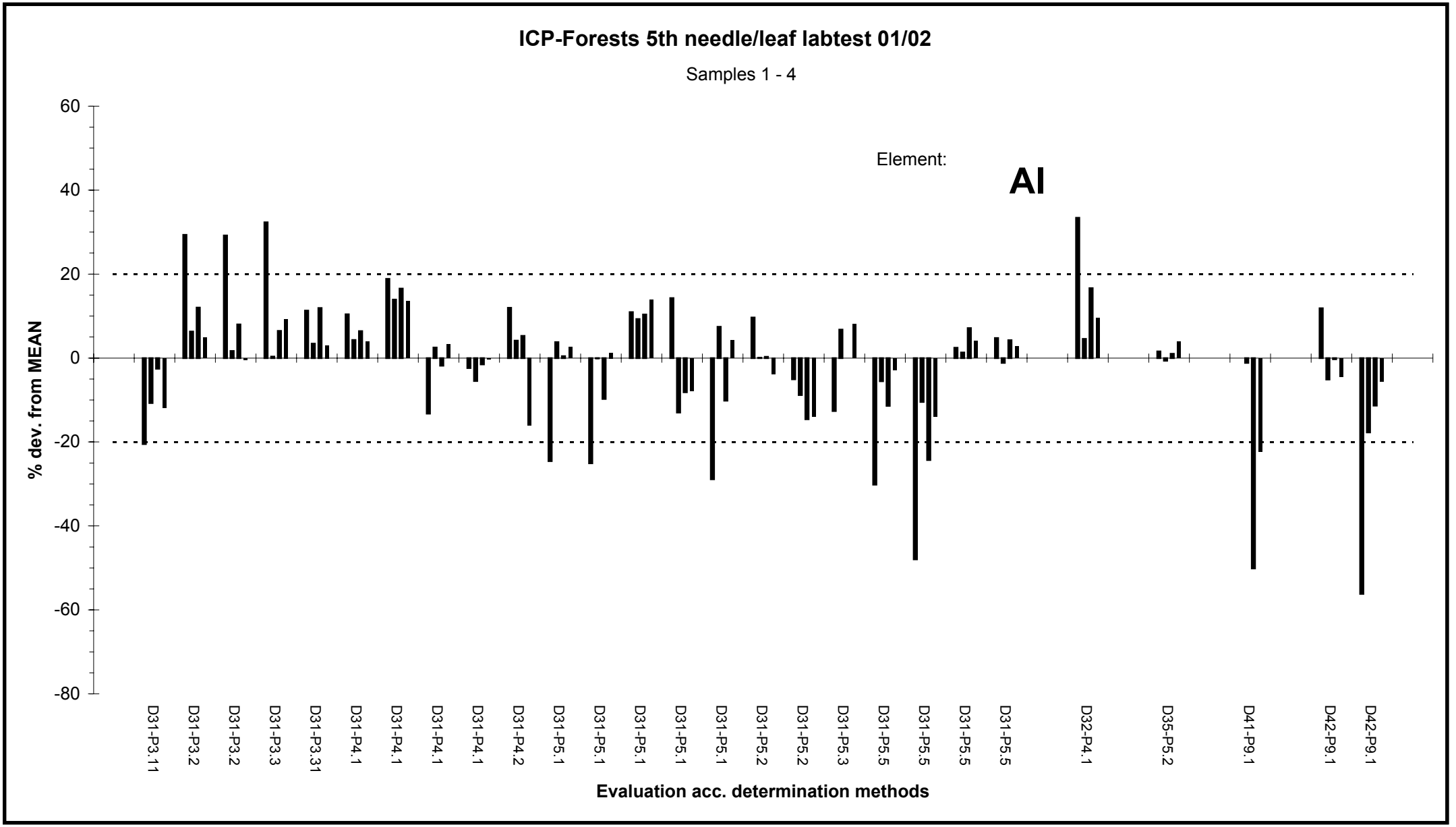

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Pb
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN
D21-P6.1
D22-P.51
D22-P3.3
D22-P4.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.5
D22-P5.5
D31-P3.11
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D32-P4.1
D32-P5.1
D32-P5.2
D35-P3.2
D35-P5.5
D41-P3.2
D41-P9.1
D42-P9.1
Evaluation acc. determination methods

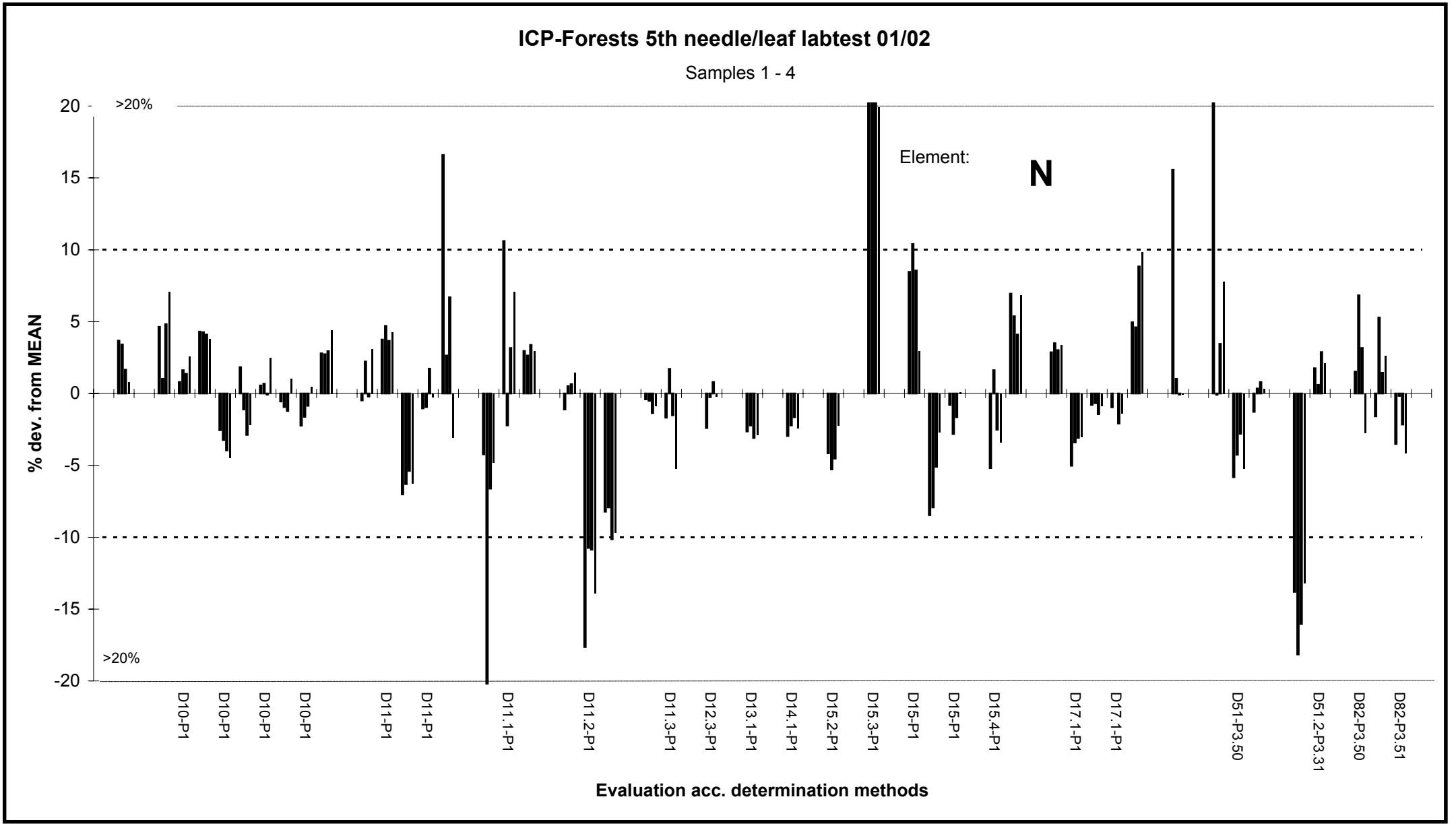

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
B
60
40
20
0
-20
-40
-60
% dev. from MEAN
D31-P3.11
D31-P3.2
D31-P3.3
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P6.1
D31-P6.4
D54.1-P6.4
D54.2-P6.1
D54.2-P6.5
Evaluation acc. determination methods

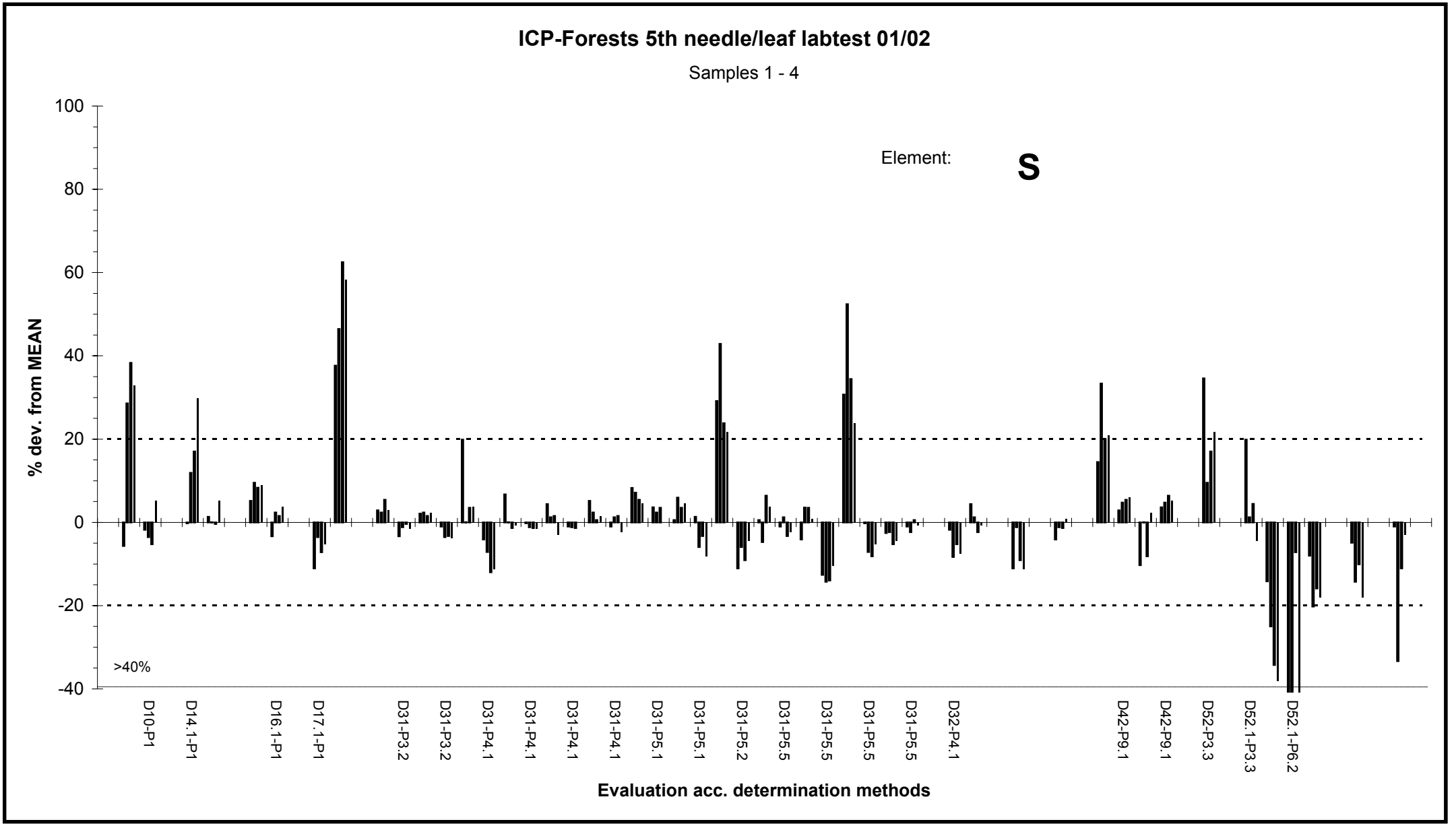

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Cd
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN
D22-P.51
D22-P3.3
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.5
D22-P5.5
D31-P3.11
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D32-P4.1
D32-P5.1
D32-P5.2
D35-P3.2
D35-P5.5
D41-P3.2
D41-P9.1
Evaluation acc. determination methods

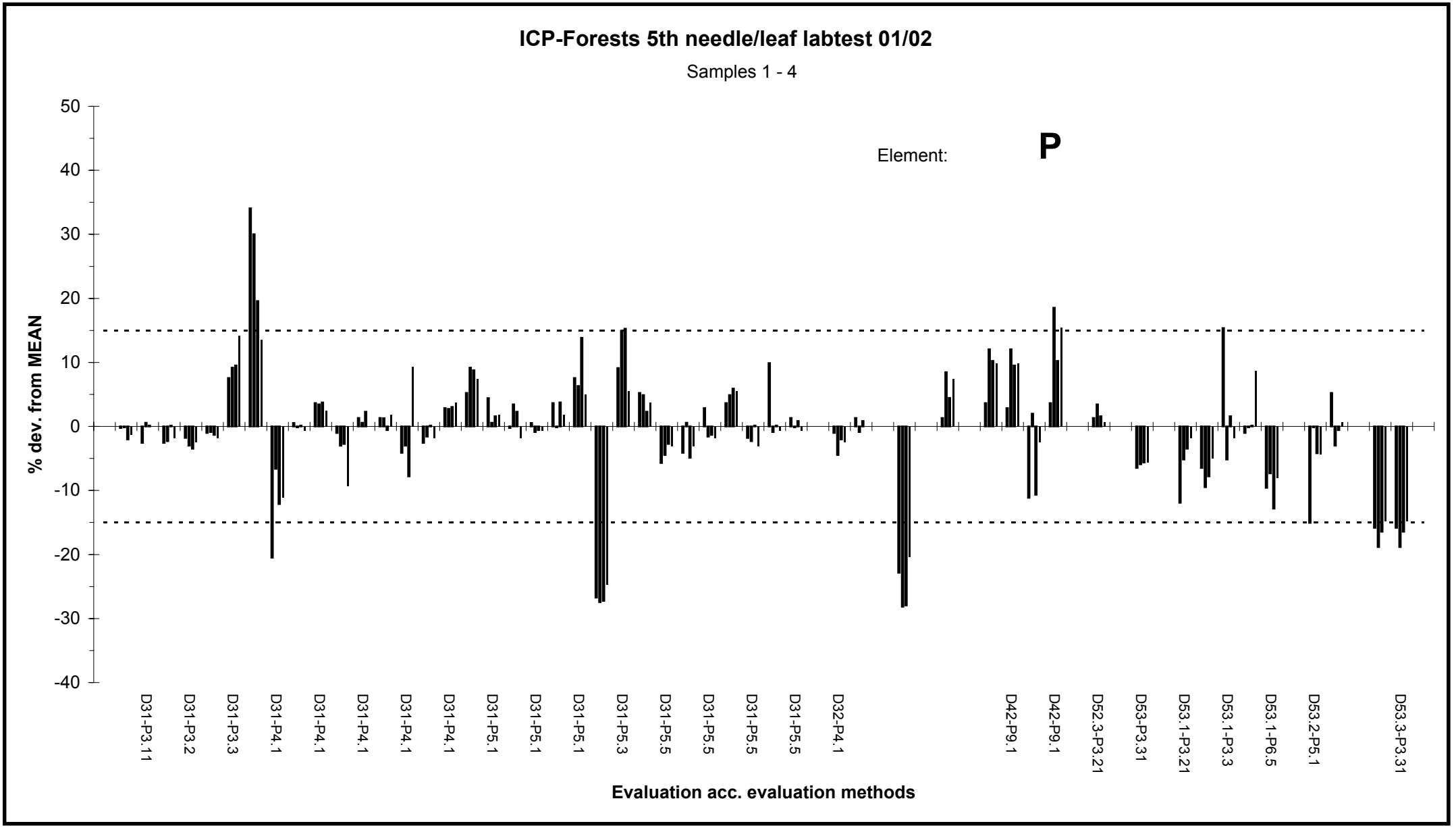

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
C
10
5
0
-5
-10
% dev. from MEAN
>10%
D0-P0
D0-P0
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D13-P1
D13-P1
D15-P1
D15-P1
D15-P1
D15.2-P1
D15.3-P1
D15.4-P1
D15.4-P1
D17.1-P1
D17.1-P1
D17.1-P1
D17.1-P1
D18.1-P1
D81-P1
D82.3-P3.21
Evaluation acc. determination methods

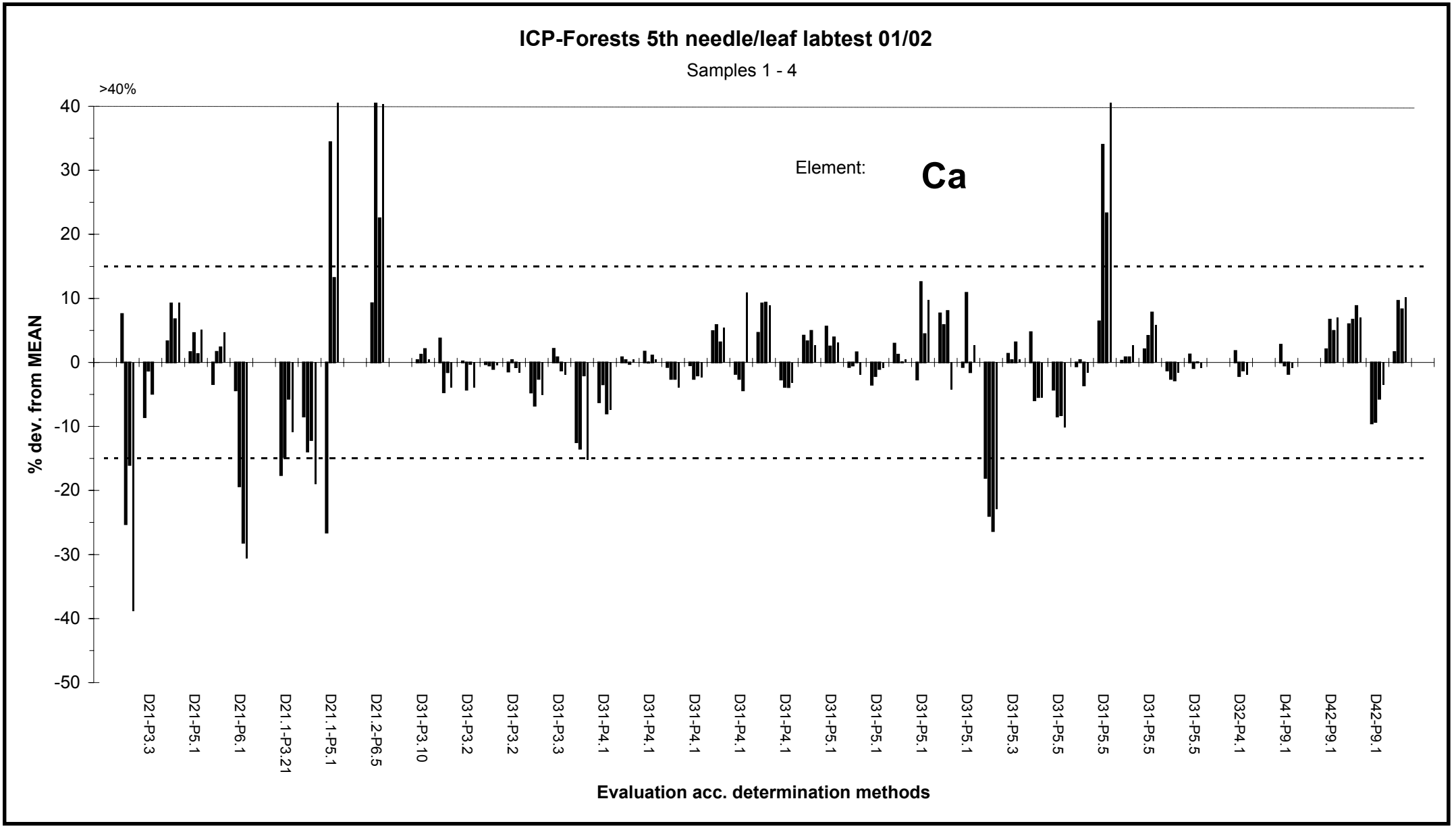

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Na
>200%
200
150
100
50
0
-50
-100
% dev. from MEAN
D21-P5.1
D21-P6.1
D21.1-P5.1
D21.1-P6.5
D28-P21
D28-P3.3
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D35-P5.1
D35-P5.1
D42-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

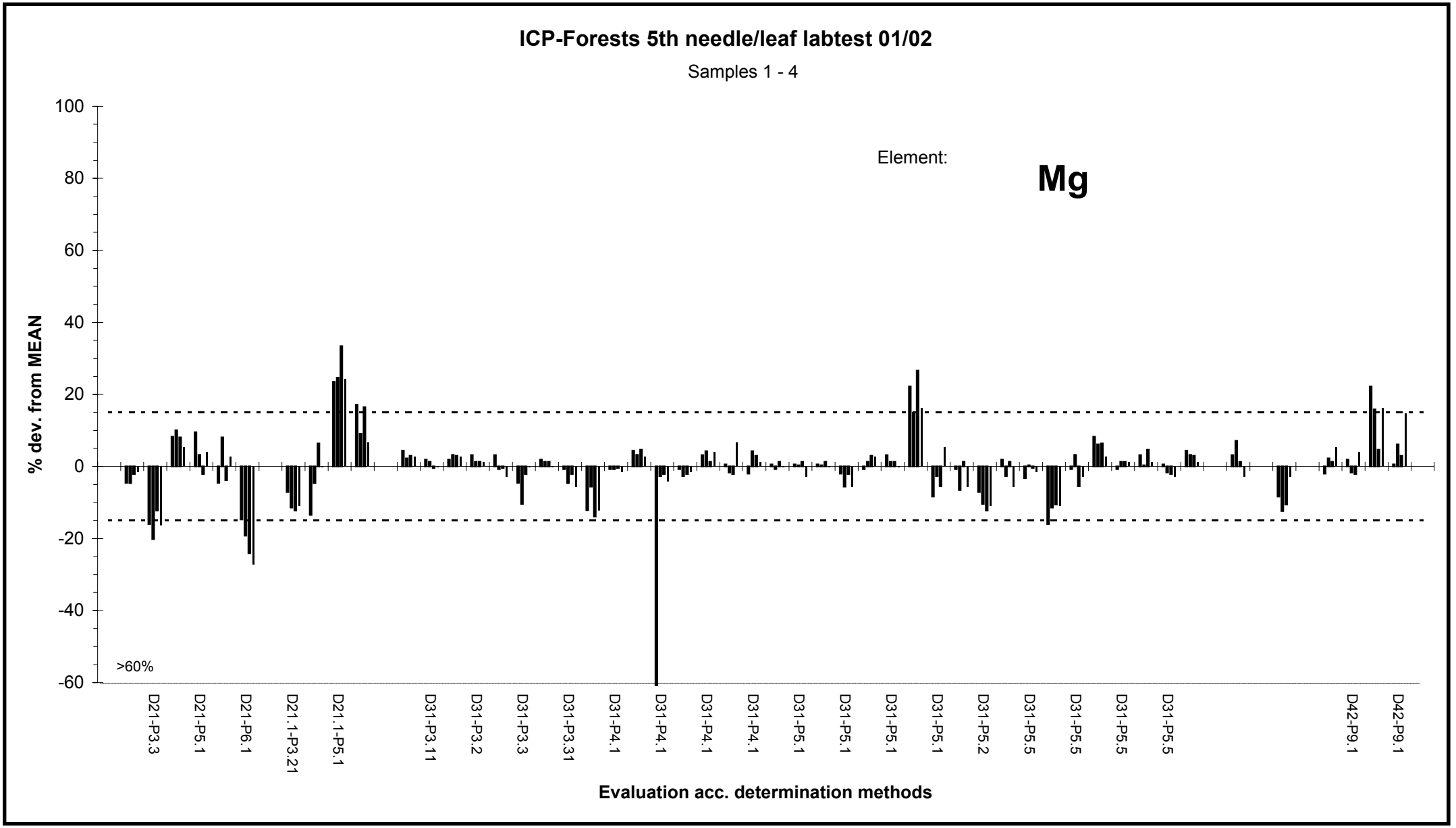

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Al
% dev. from MEAN
60
40
20
0
-20
-40
-60
-80
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.2
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D35-P5.2
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

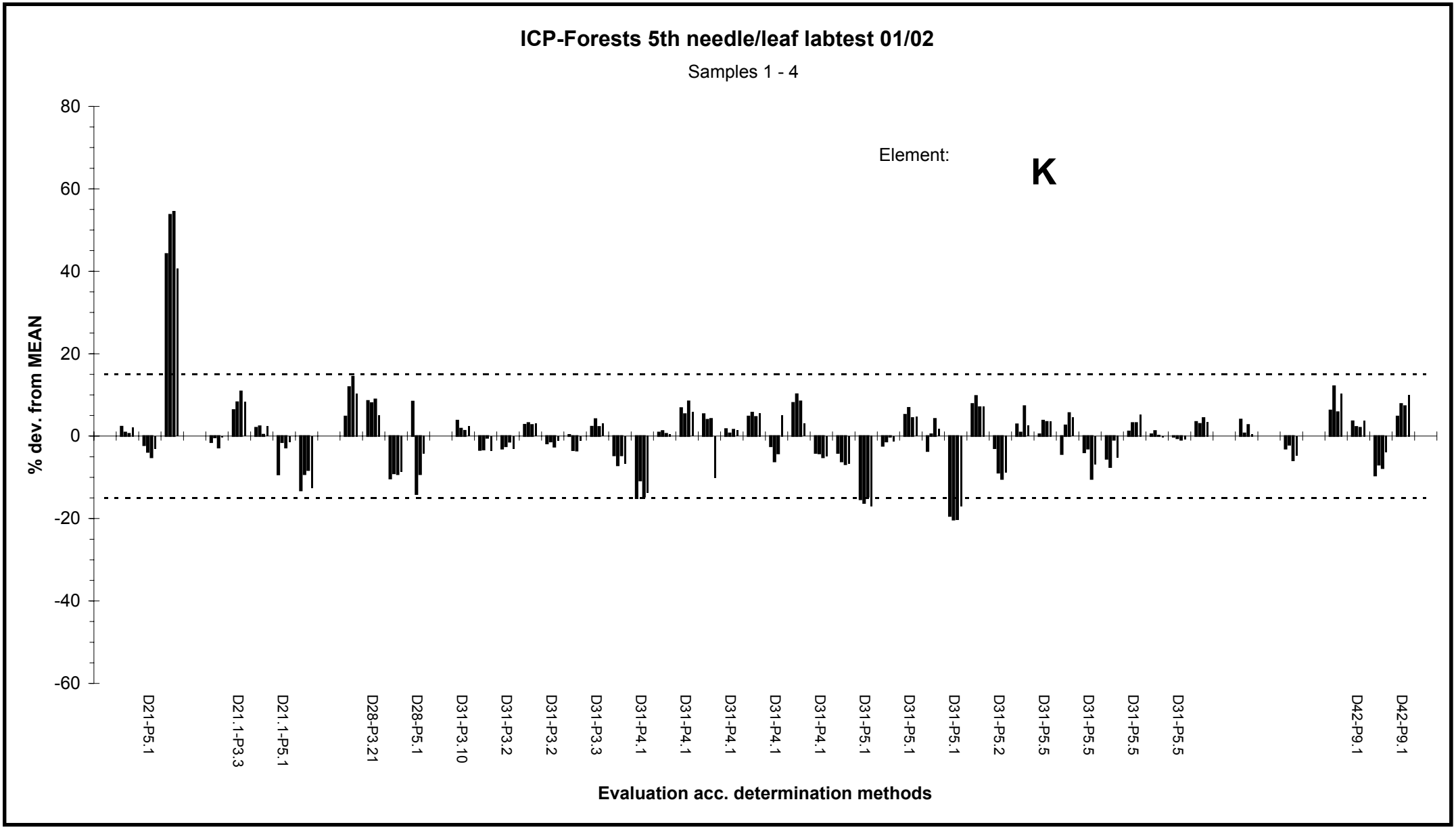

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
N
>20%
>20%
20
15
10
5
0
-5
-10
-15
-20
% dev. from MEAN
D10-P1
D10-P1
D10-P1
D10-P1
D11-P1
D11-P1
D11.1-P1
D11.2-P1
D11.3-P1
D12.3-P1
D13.1-P1
D14.1-P1
D15.2-P1
D15.3-P1
D15-P1
D15-P1
D15.4-P1
D17.1-P1
D17.1-P1
D51-P3.50
D51.2-P3.31
D82-P3.50
D82-P3.51
Evaluation acc. determination methods

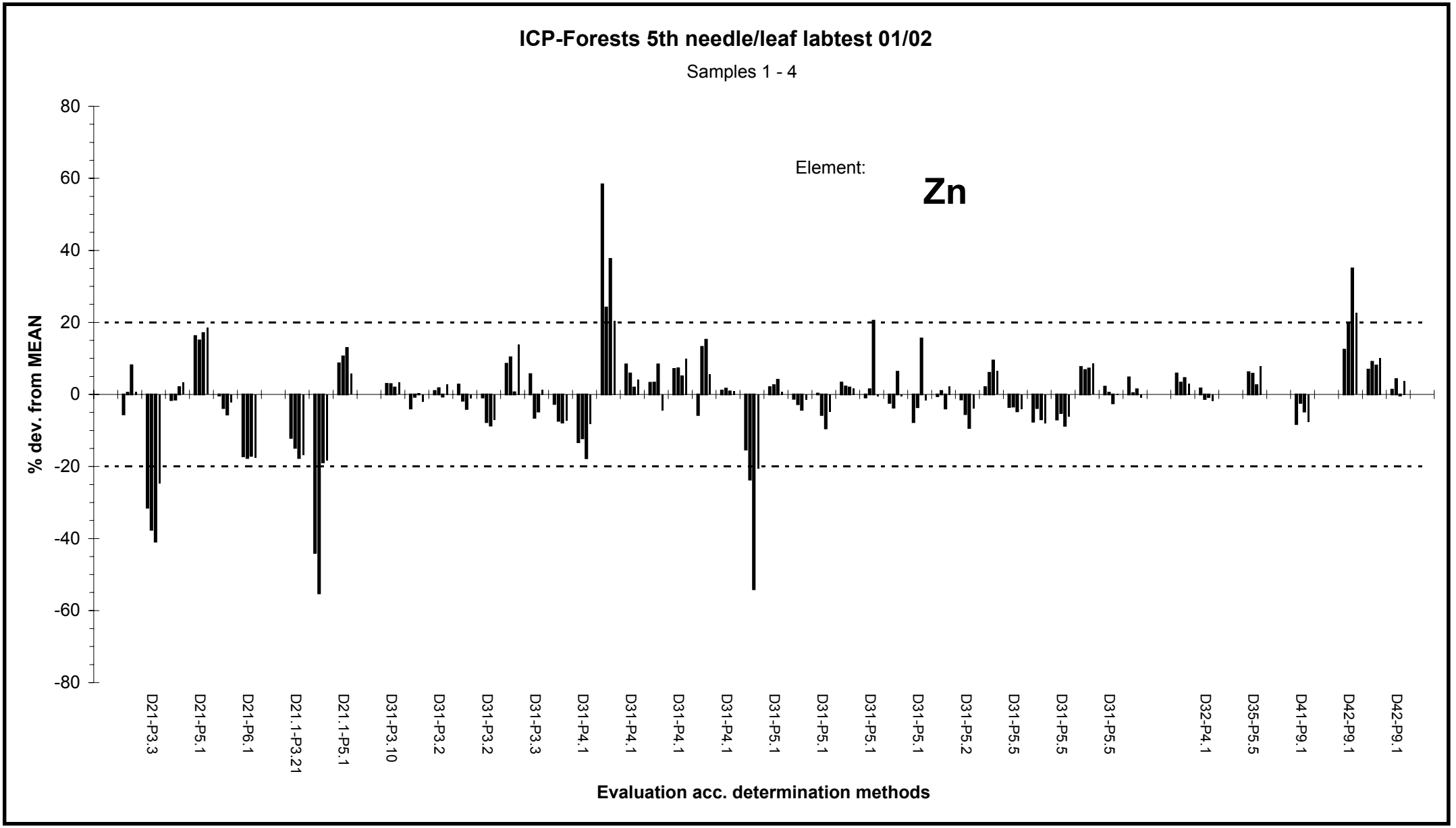

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
S
100
80
60
40
20
0
-20
-40
% dev. from MEAN
>40%
D10-P1
D14.1-P1
D16.1-P1
D17.1-P1
D31-P3.2
D31-P3.2
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D42-P9.1
D42-P9.1
D52-P3.3
D52.1-P3.3
D52.1-P6.2
Evaluation acc. determination methods

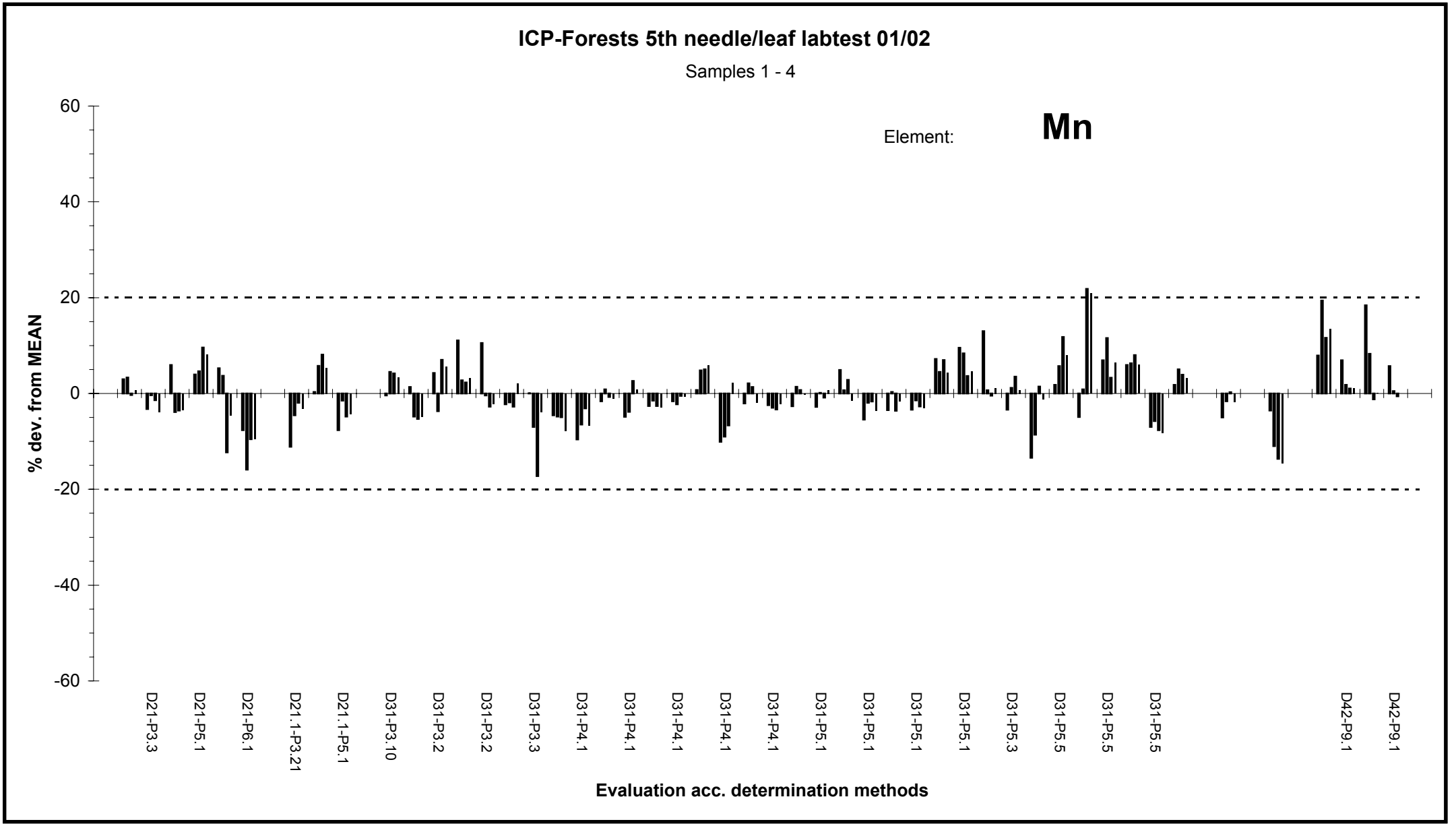

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: P
% dev. from MEAN
50
40
30
20
10
0
-10
-20
-30
-40
D31-P3.11
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D42-P9.1
D42-P9.1
D52.3-P3.21
D53-P3.31
D53.1-P3.21
D53.1-P3.3
D53.1-P6.5
D53.2-P5.1
D53.3-P3.31
Evaluation acc. evaluation methods

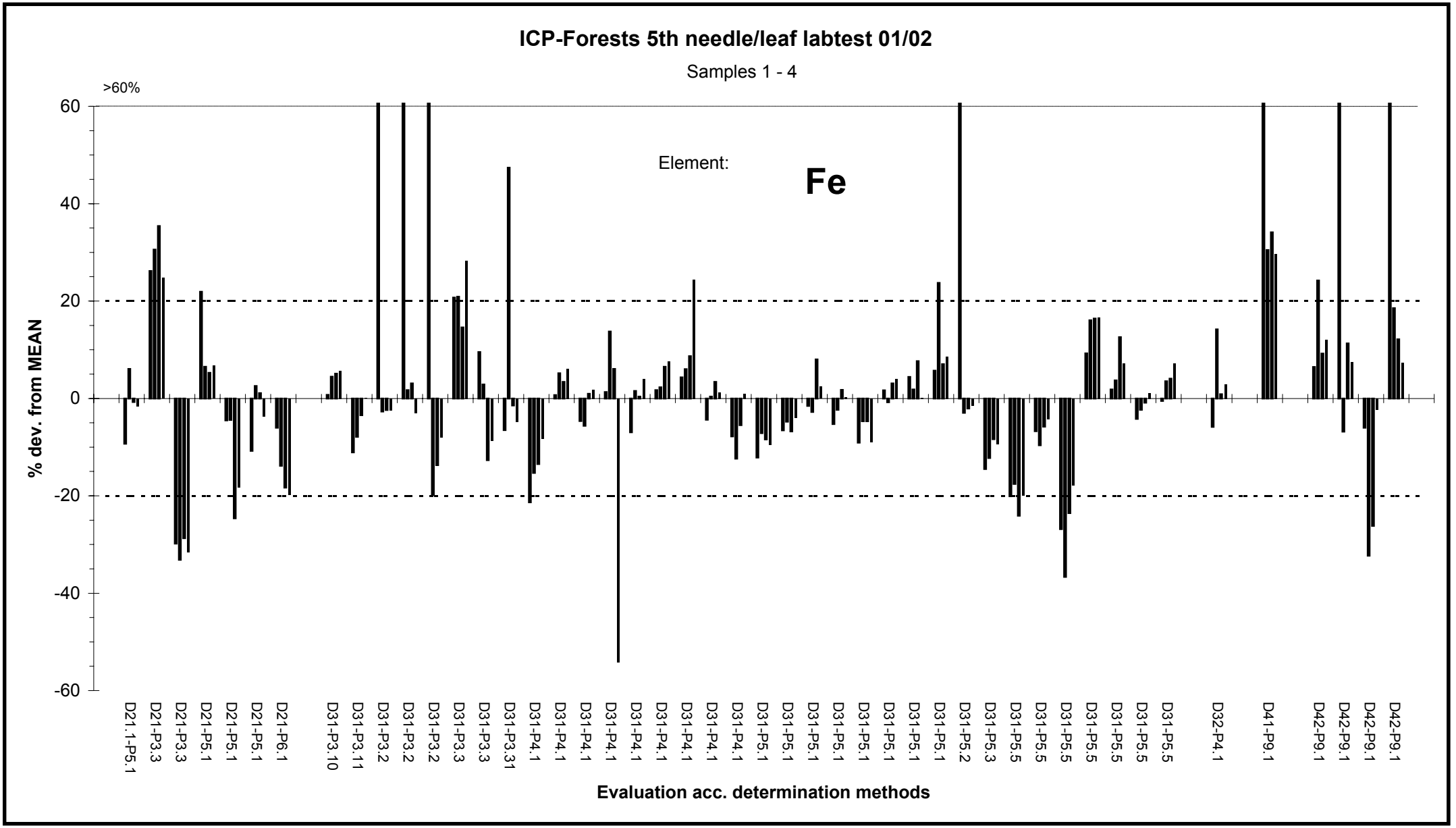

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
>40%
Element:
Ca
% dev. from MEAN
40
30
20
10
0
-10
-20
-30
-40
-50
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D21.2-P6.5
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

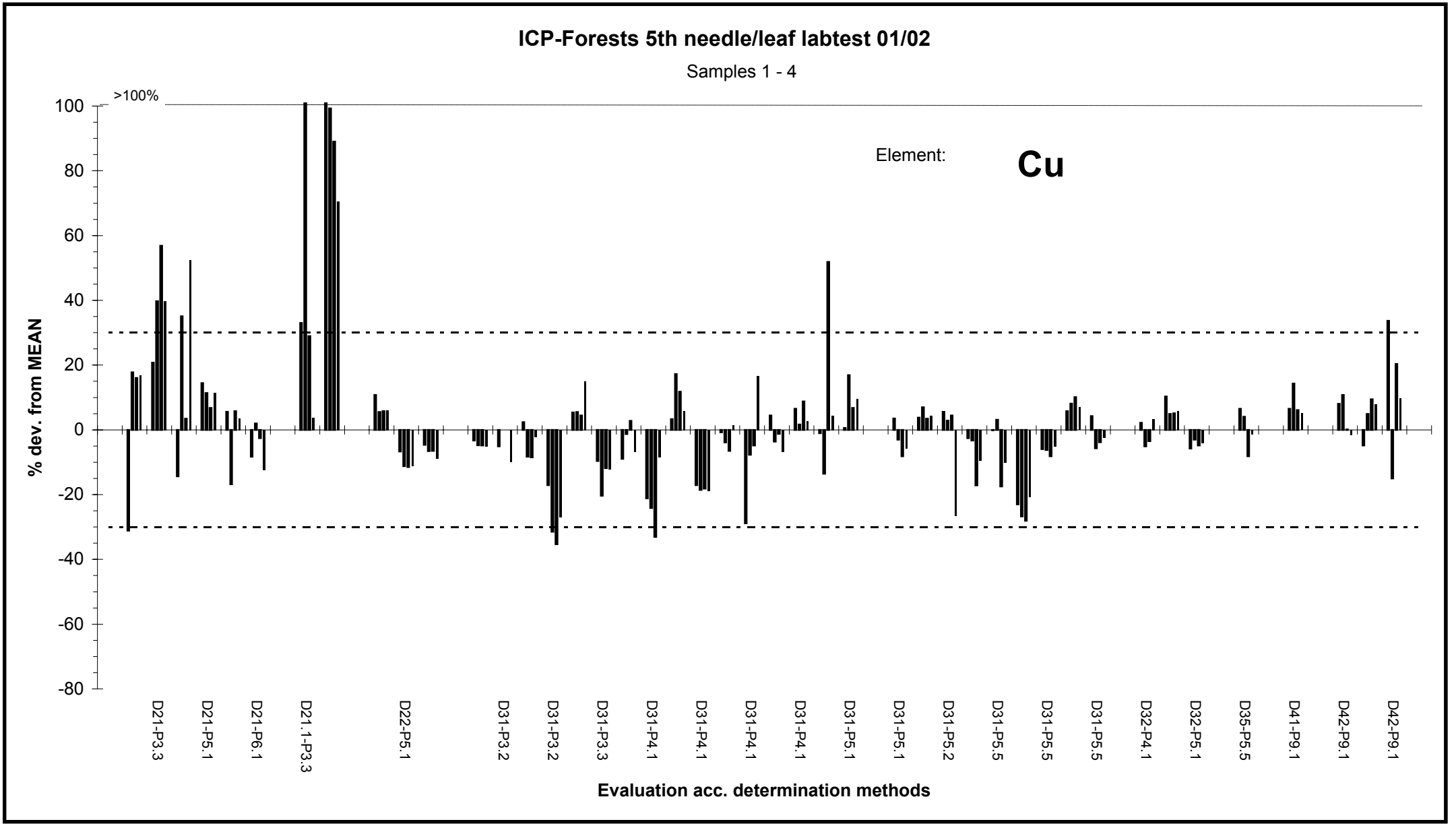

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Mg
100
80
60
40
20
0
-20
-40
-60
% dev. from MEAN
>60%
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.11
D31-P3.2
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

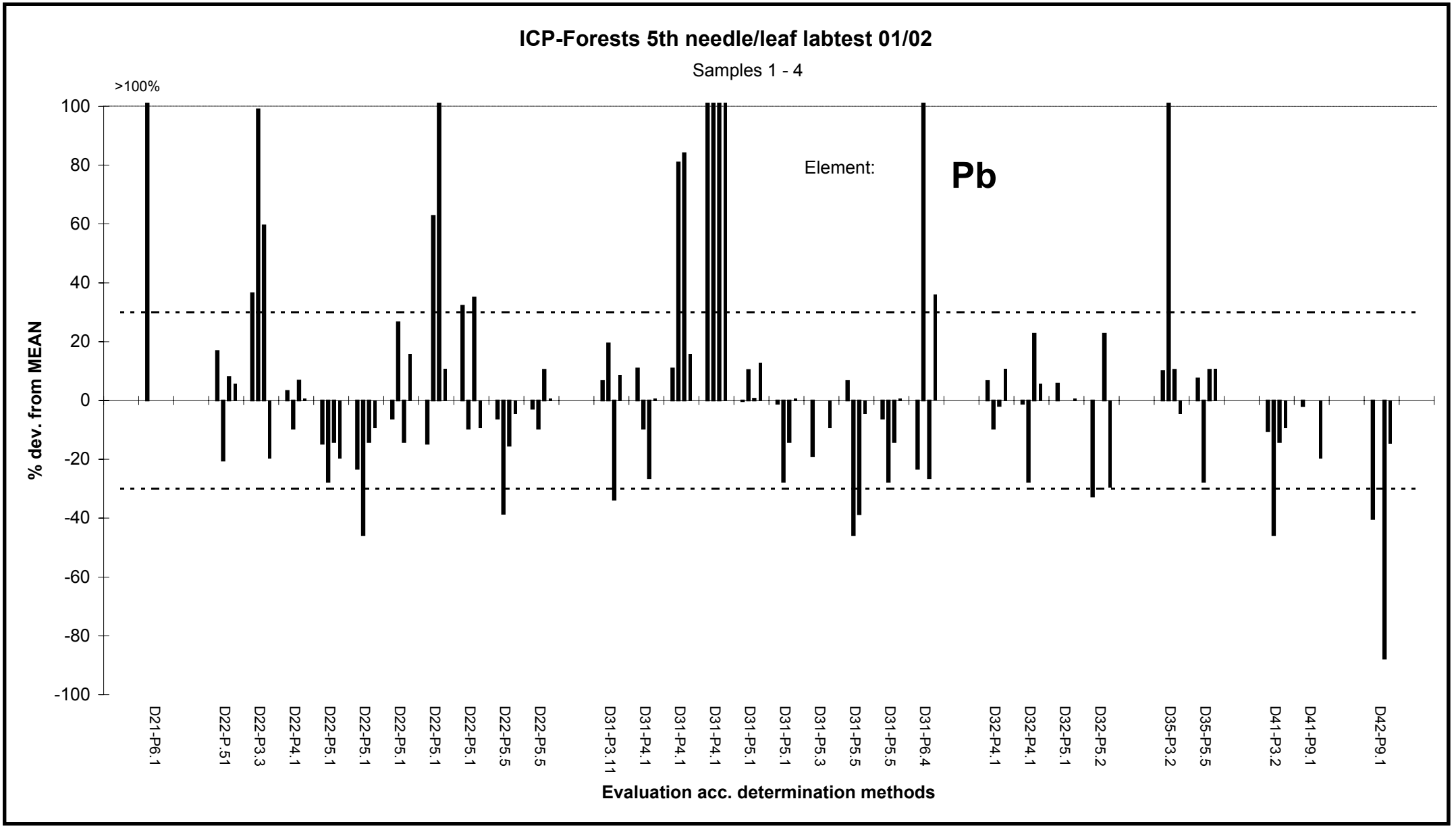

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
K
80
60
40
20
0
-20
-40
-60
% dev. from MEAN
D21-P5.1
D21.1-P3.3
D21.1-P5.1
D28-P3.21
D28-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

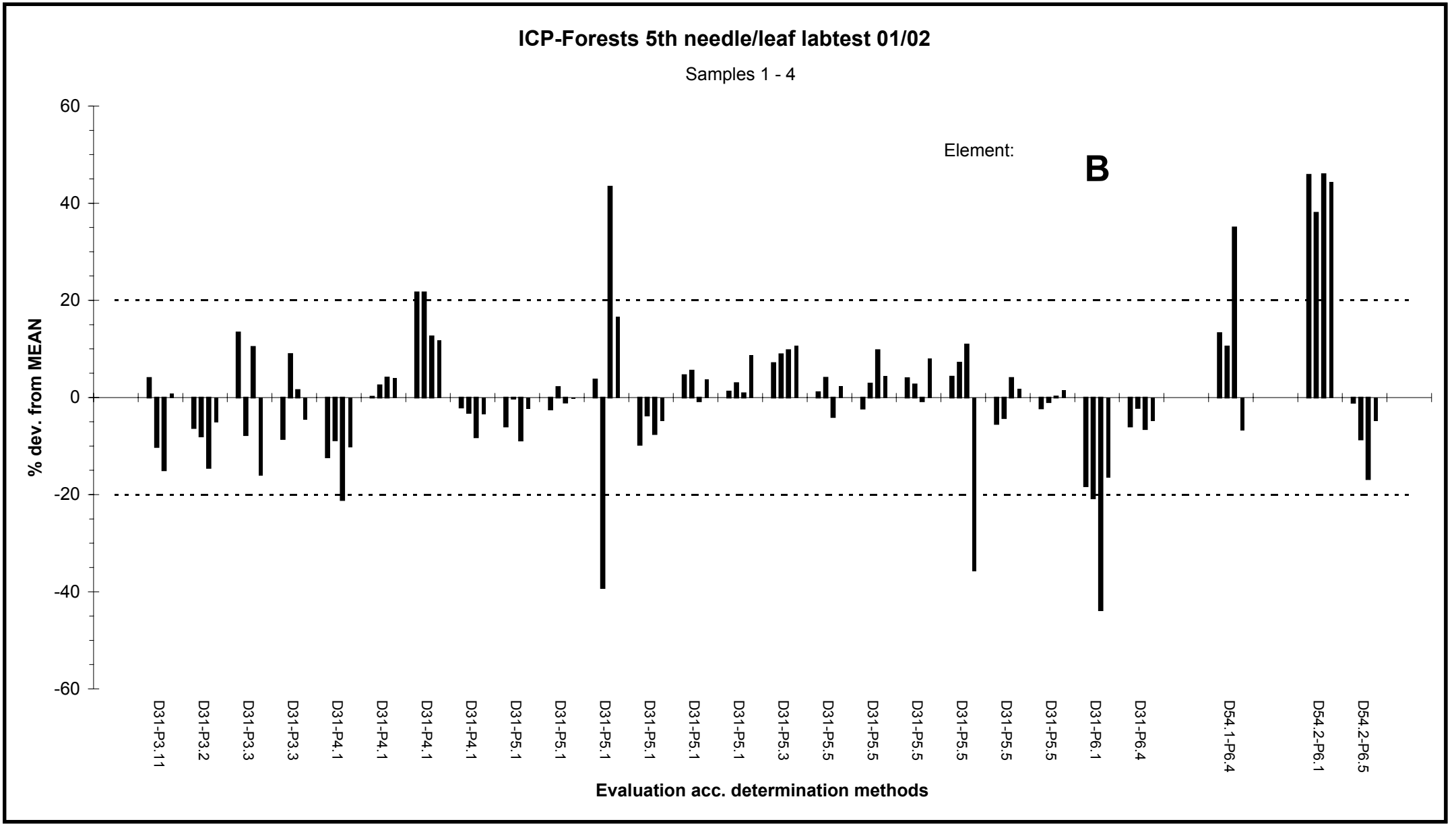

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Zn
% dev. from MEAN
80
60
40
20
0
-20
-40
-60
-80
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D35-P5.5
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

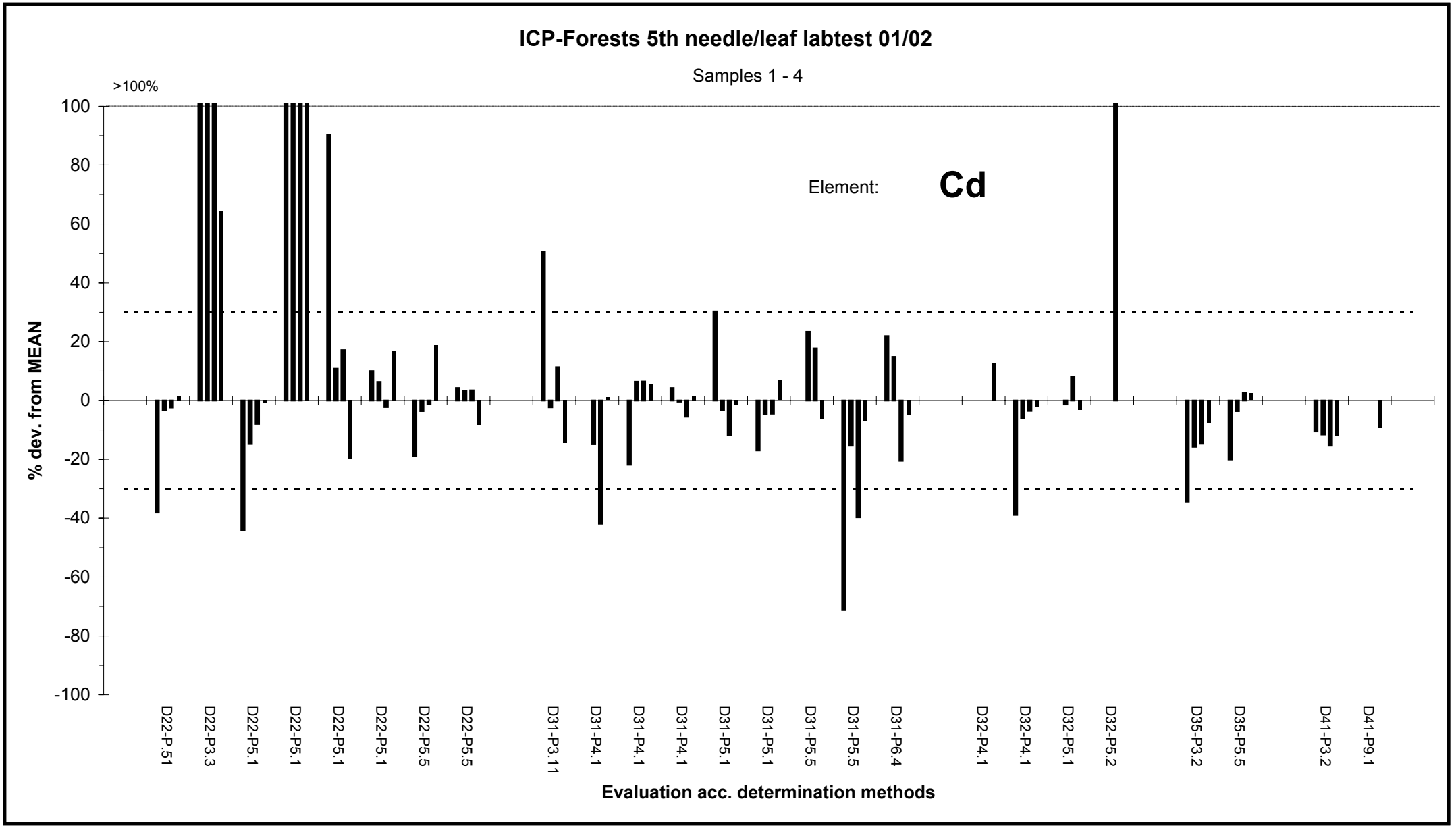

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Mn
60
40
20
0
-20
-40
-60
% dev. from MEAN
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.21
D21.1-P5.1
D31-P3.10
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

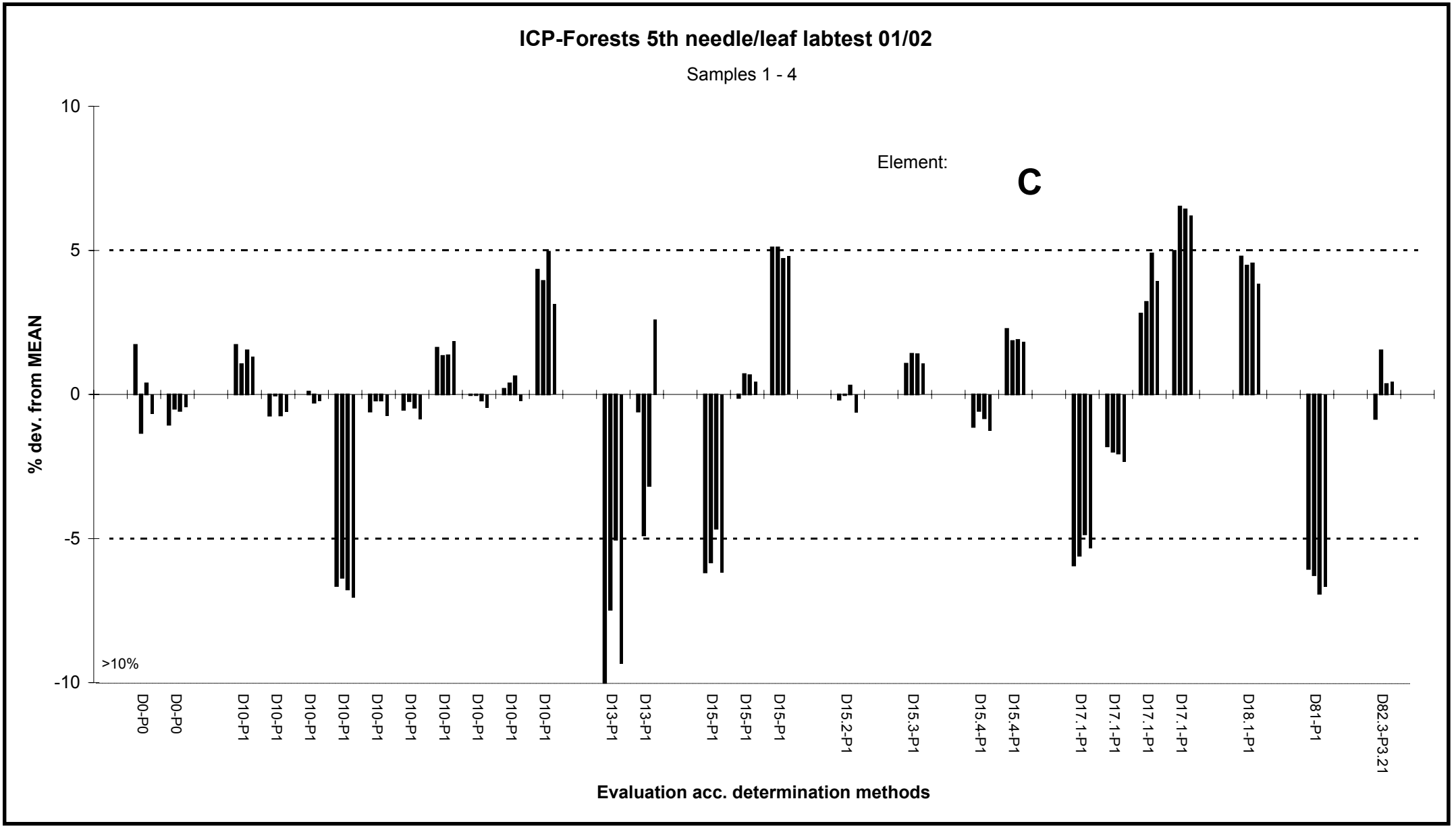

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
>60%
Element:
Fe
% dev. from MEAN
60
40
20
0
-20
-40
-60
D21.1-P5.1
D21-P3.3
D21-P3.3
D21-P5.1
D21-P5.1
D21-P5.1
D21-P6.1
D31-P3.10
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.2
D31-P3.3
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D41-P9.1
D42-P9.1
D42-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

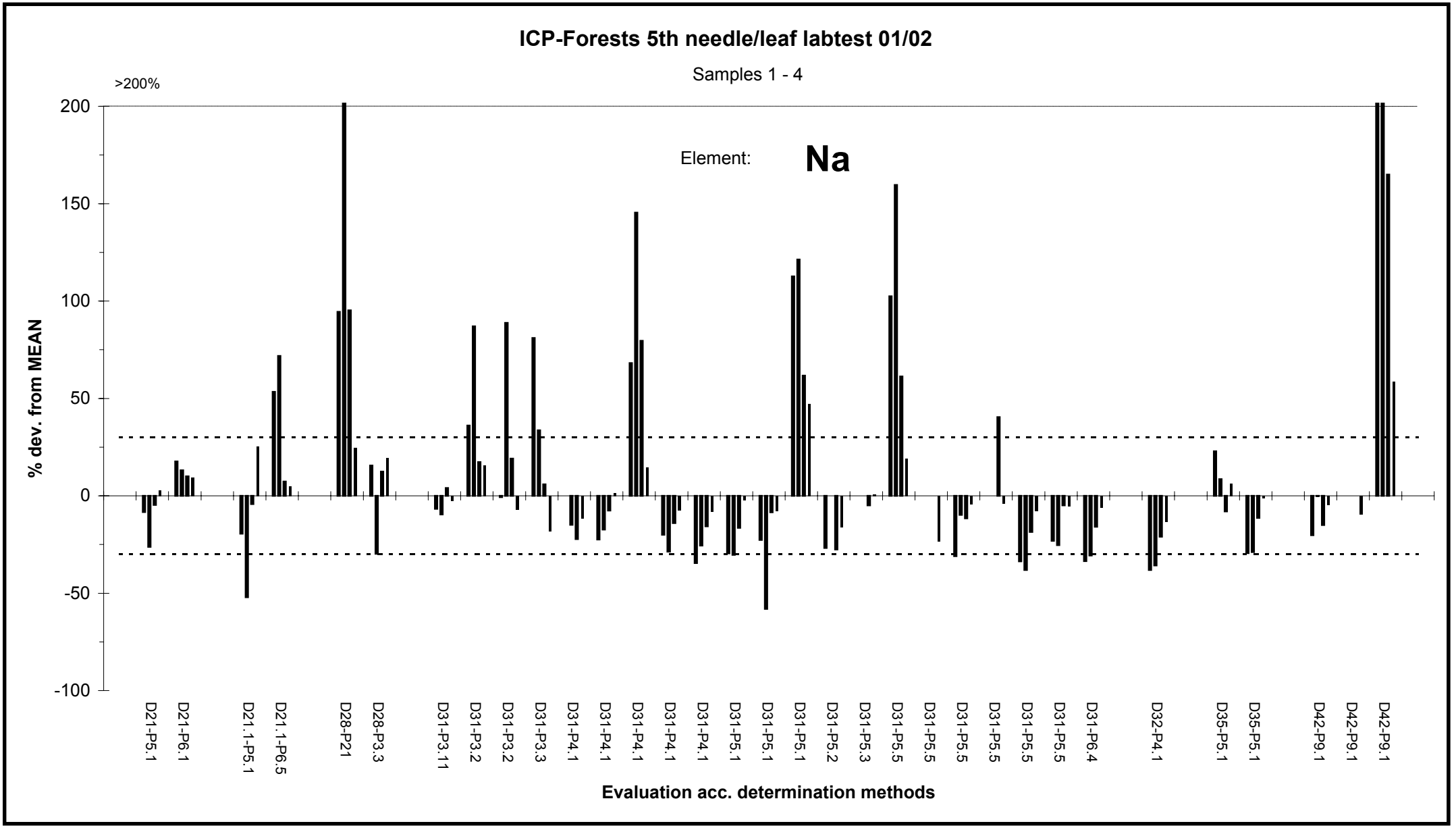

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Cu
>100%
100
80
60
40
20
0
-20
-40
-60
-80
% dev. from MEAN
D21-P3.3
D21-P5.1
D21-P6.1
D21.1-P3.3
D22-P5.1
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D32-P5.1
D35-P5.5
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

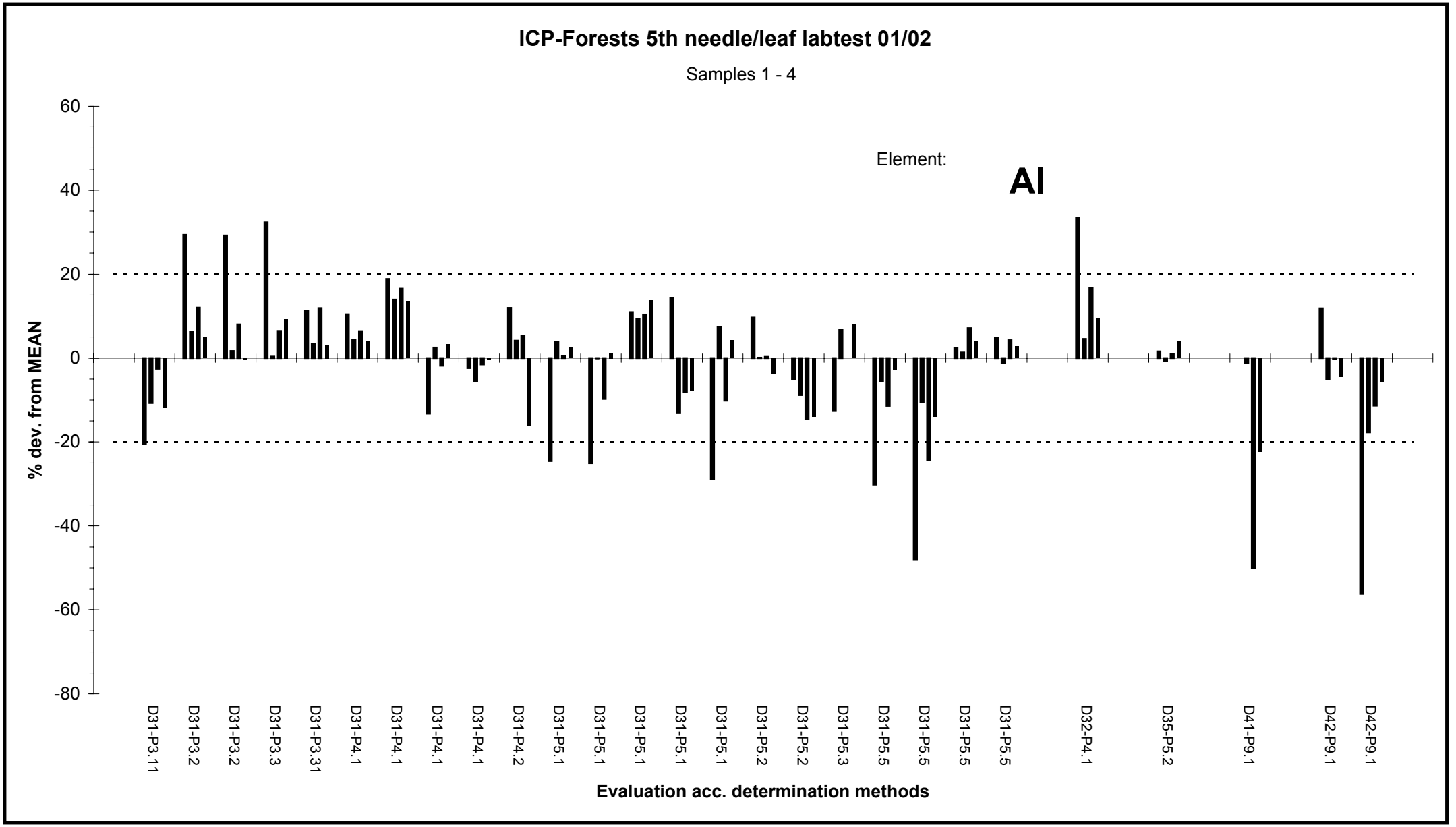

ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Pb
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN
D21-P6.1
D22-P.51
D22-P3.3
D22-P4.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.5
D22-P5.5
D31-P3.11
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D32-P4.1
D32-P5.1
D32-P5.2
D35-P3.2
D35-P5.5
D41-P3.2
D41-P9.1
D42-P9.1
Evaluation acc. determination methods


ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
B
60
40
20
0
-20
-40
-60
% dev. from MEAN
D31-P3.11
D31-P3.2
D31-P3.3
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P6.1
D31-P6.4
D54.1-P6.4
D54.2-P6.1
D54.2-P6.5
Evaluation acc. determination methods


ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Cd
>100%
100
80
60
40
20
0
-20
-40
-60
-80
-100
% dev. from MEAN
D22-P.51
D22-P3.3
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.1
D22-P5.5
D22-P5.5
D31-P3.11
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D32-P4.1
D32-P5.1
D32-P5.2
D35-P3.2
D35-P5.5
D41-P3.2
D41-P9.1
Evaluation acc. determination methods


ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
C
10
5
0
-5
-10
% dev. from MEAN
>10%
D0-P0
D0-P0
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D10-P1
D13-P1
D13-P1
D15-P1
D15-P1
D15-P1
D15.2-P1
D15.3-P1
D15.4-P1
D15.4-P1
D17.1-P1
D17.1-P1
D17.1-P1
D17.1-P1
D18.1-P1
D81-P1
D82.3-P3.21
Evaluation acc. determination methods


ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element: Na
>200%
200
150
100
50
0
-50
-100
% dev. from MEAN
D21-P5.1
D21-P6.1
D21.1-P5.1
D21.1-P6.5
D28-P21
D28-P3.3
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.3
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D31-P6.4
D32-P4.1
D35-P5.1
D35-P5.1
D42-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods


ICP-Forests 5th needle/leaf labtest 01/02
Samples 1 - 4
Element:
Al
% dev. from MEAN
60
40
20
0
-20
-40
-60
-80
D31-P3.11
D31-P3.2
D31-P3.2
D31-P3.3
D31-P3.31
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.1
D31-P4.2
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.1
D31-P5.2
D31-P5.2
D31-P5.3
D31-P5.5
D31-P5.5
D31-P5.5
D31-P5.5
D32-P4.1
D35-P5.2
D41-P9.1
D42-P9.1
D42-P9.1
Evaluation acc. determination methods

ICP Forests 5th needle/leaf interlaboratory test 2001/2002

Additional parameters

Element	Lab	Methods	Sample 1	Sample 2	Sample 3	Sample 4
As (µg/g)	40	P5.8-D31	0,83	0,61	0,43	0,31
Ba (µg/g)	4a	P9.1-D41	85,10	3,86	7,30	3,57
	45	P5.5-D31	101,00	4,40	8,30	2,30
	50	P4.1-D31	93,50	3,70	7,40	2,70
Cl (mg/g)	3	P3-D82.5	0,42	0,26	0,53	0,61
	4a	P9.1-D41	0,38	0,25	0,53	0,61
	12	P2.1-D60	0,48	0,28	0,56	0,62
	38a	P9.1-D42	0,40	0,27	0,57	0,64
	48	P2.2-D82.5	0,42	0,27	0,56	0,63
	55a	P9.1-D42	0,45	0,30	0,57	0,62
Co (µg/g)	16	P5.5-D31	<0,01	0,11	0,13	0,58
	44	P4.1-D32	0,25	0,26	0,25	0,71
	45	P5.5-D31	0,09	0,16	0,13	0,63
	50	P4.1-D31	< 0,05	0,12	0,12	0,55
Cr (µg/g)	4a	P9.1-D41	5,2	6,2	2,8	4,8
	16	P5.5-D31	3,39	6,46	2,88	4,78
	45	P5.5-D31	4,3	7,80	3,40	5,70
	44	P4.1-D32	4,25	6,66	3,20	5,26
	45	P5.2-D31	4,77	6,33	2,87	4,87
	50	P4.1-D31	3,77	5,66	2,86	4,66
F (µg/g)	3	P7.1-D72.1	6,60	3,30	4,30	4,60
Hg (ng/g)	25	Hg-Analyzer Altec Ama 254	55,60	13,60	66,20	47,70
	46	P7-22 AMA Leco	53,17	13,57	65,01	47,57
Mo (µg/g)	16	P5.5-D31	0,17	0,23	<0,15	0,19
	40	P5.8-D31	0,16	0,08	0,13	0,09
	50	P4.1-D31	0,32	< 0,25	< 0,25	< 0,25
Ni (µg/g)	4a	P9.1-D41	1,30	4,40	4,20	5,20
	18	P3.11-D31	1,61	3,71	3,47	4,59
	44	P4.1-D32	1,70	4,36	3,97	5,33
	44	P4.1-D32	2,20	5,10	4,30	5,30
	45	P5.2-D31	1,67	4,58	3,79	5,05
	50	P4.1-D31	1,45	4,31	3,67	4,76
Rb (µ/g)	4a	P9.1-D41	1,60	33,90	21,70	13,40
Si (mg/g)	4a	P9.1-D41	6,27	0,48	3,04	0,88
	40	P5.8-D31	1,61	0,21	1,65	0,68
	55a	P9.1-D42	5,27	0,42	2,82	0,81

Sr (µg/g)	4a	P9.1-D41	74,10	4,70	4,30	4,00
	38a	P9.1-D42	76,70	5,70	5,30	4,60
	44	P4.1-D32	76,70	4,70	4,10	3,60

Ti (µg/g)	44	P4.1-D32	4,70	2,20	3,10	2,60

Dry mass						
105° C (%)	39	D81	93,80	94,40	94,30	93,80
	45	D81	94,23	93,90	94,68	94,05