

International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests of UN/ECE (ICP Forests)**Minutes of the 15th ICP Forests Expert Panel on Foliage and Litterfall**

19 participants from 12 countries attended the meeting (Annex 1).

The 15th EP on Foliage & Litterfall meeting took place on 29th March 2017 in Zagreb, Croatia.

1. The chairman (Pasi Rautio) opened the meeting
2. The meeting adopted the attached agenda (Annex 2).
3. The chairman presented a request to include Level I foliar data collected in mid-1990's to the TRY database (Plant Trait Database). Chairman gave an overview on the ICP Forests Level I foliar data and on TRY database. The EP discussed on the different aspects what it would mean if the data is stored in the TRY database. The EP decided to deliver foliar Level I data for the external use. Plot coordinates will be forwarded by an accuracy of minutes in accordance to ICP Forests data policy. In case TRY need more accurate coordinates for the plot location they need to contact the data providers (NFCs). ICP Forests needs to be acknowledged in TRY database where this data is described.
4. Co-chair Liisa Ukonmaanaho gave an update on the state of the European litterfall data in the ICP Forests database and the update of litterfall manual. The updated manual was accepted in the Task Force in 2016. Plausible element values to other litterfall fractions than foliar litterfall (e.g. branches, seeds) are still missing. In the database the reference address to the codes of most damaging species (e.g. bark beetle etc.) is wrong but will be corrected soon.
5. Expert panel members gave presentations about the ongoing European foliar and litterfall data assessments (the presentations can be found in FFCC homepage: www.ffcc.at).
 - i. Maria Schmitt presented results of the study: "Determination of the correction factor to express nutrient concentrations in reference to material dried at 105°C: some methodological issues?"
 - Results of this study suggest that the drying and weighing procedure needs to be discussed in the meeting of head of the laboratories. In case the subsample of ground needle to be dried at 105 °C is stored for a long time (even in air tight) before drying the weight might change hence the correction factor might be inaccurate.
 - ii. Anne Thimonier gave a presentation about "Temporal variation of nutrient concentrations in foliage: possible effects of fruiting intensity".
 - Results of this study suggest that when computing trends for nutrient concentrations one should take masting years into account as e.g foliar P might be affected by masting
 - iii. Anita Nussbaumer gave an update for the study "The Seed-C project: Carbon allocation to fruits and seeds in European forests as a function of climate, atmospheric deposition and nutrient supply".

- This manuscript was submitted to journal *Forest Ecology and Management* and now major revision is needed. Ms. Nussbaumer has computed some new results that she presented in the meeting.

iv. Mathias Neumann presented results of the study: “Opportunities and challenges using ICP data to understand the importance of litterfall in the European carbon cycle“

-The study raises the question if litterfall information reported to the database is corrected for 105°C in the reported data of all years and all countries. Oven-drying results in loss of volatile components such as phenoles, terpenoides or alcohols even at temperatures like 70°C. → these issues should be discussed at the meeting of head of labs.

v. Hans-Peter Dietrich presented ongoing research: “Specification of biogeochemical threshold values for cultivation of tree species facing climate change”

- This study (Mellert & Göttelein, TUM) aims to find out how tree species vulnerability to impacts of climate change is affected by geochemical site conditions and the nutrient status

vi. Päivi Merilä presented results for: “Plant necromass and moss and lichen layer are the clearest indicators of Cu and Ni deposition in a subarctic forest”

-Results of this study show that also foliage and litterfall can be used as a bioindicators for Cu and Ni deposition.

vii. Anne-Katrin Prescher presented a study by Jens Edinger & Tanja Sanders: “N and N:P ratio in leaves and needles” that is aimed to be in ICP Forests Technical Report 2017.

viii. Pasi Rautio (on behalf of co-chair Alfred Fürst) presented results of the study of “Mercury in tree foliage”

- Results of this study suggest that mercury (Hg) is a global, European and local air pollutant. Most of the Hg in air is Hg⁰ (99%). Foliage is an important sink for Hg and the foliar concentration correlates with the exposure time. Study also shows that Hg losses from drying of the samples are small (most of the samples only 1-5%; some samples 5-10% at 80°C for 8 hours). In all, the results of this study supports to include Hg as an optional parameter to be included in the ICP-Forests monitoring program due to its environmental relevance and because tree foliage and litterfall are suitable as bioindicators for Hg.

6. On behalf of the co-chair Alfred Fürst the chairman gave an introduction to the possibility to include new heavy metals as optional parameters to foliar and litterfall monitoring. Results of the 18th and 19th Needle/Leaf Interlaboratory Tests suggest that the present data quality already warrants to include As, Cr, Co, Hg and Ni as elements to be monitored in foliar and litterfall in ICP-Forests monitoring programme.

- The panel agreed to include the elements As, Cr, Co, Hg and Ni with the proposed evaluation limits (see table below) as optional parameters in the ICP-Forests monitoring for foliage and litterfall. The final decision need to be made in the coming ICP Forests Task Force Meeting.

Table 1. Proposed evaluation limits for new optional parameters As, Cr, Co, Hg and Ni EP Foliar and Litterfall suggests to be analysed in foliar and litterfall samples.

Parameter	Unit	Conc. Range low	Tolerable Limit low ^{*)}	Conc. Range high	Tolerable Limit high ^{*)}	max. LOQ ^{**)}	Lowest result ^{***)}
Arsenic	ng/g	≤ 50	30%	> 50	20%	50	20
Chromium	µg/g	≤ 1	35%	> 1	25%	1	0.5
Cobalt	µg/g	≤ 0.1	35%	> 0.1	25%	0.1	0.05
Mercury	ng/g	≤ 50	30%	> 50	20%	20	10
Nickel	µg/g	≤ 1	30%	> 1	20%	1	0.50

7. Organizational issues: Mr Fürst will take the chair of ‘Working group of laboratory QA/QC’ and will hence leave the position as co-chair of EP Foliar and litterfall. Members of the EP Foliar and litterfall would like to express their warmest gratitude for Mr. Fürst for his long lasting work for the EP, especially on the laboratory quality issues, and wish that the close co-operation continues even when he has now other obligations in the ICP Forests programme.

8. Chairman raised the issue presented by Manuel Nicholas on the joint session on Tuesday. Many ICP-Forests Level II plots are approaching the age when they need to be thinned or cut. Many of the plots have also been faced insect or wind damage and in some cases all the mature trees in a stand have been fallen down or damaged. Among other monitoring activities foliar and litterfall sampling need to be adapted to the situation in case there are no mature trees in a plot but only seedlings and saplings. This issue needs to be taken in to account in the coming manual updates so that the comparability of results from different countries remain comparable. This item needs to be discussed already in the coming EP meeting. Also the changes in the foliar sampling needs to be harmonised with the crown condition monitoring so that the foliar sampling, where e.g. random sample of saplings in the stand is used to the amount of foliage needed for foliar analyses, do not affect the crown condition assessment.

9. Chairman closed the meeting

Expert Panel wants to warmly thank the organisers of the meeting, Mr. Nenad Potočić, Ms. Tamara Jakovljević and their Croatian colleagues from Croatian Forest Research Institute.

Annex 1 (List of participants)

Annex 2 (Agenda of the meeting)

Presentations given in the meeting are available (as pdf-format) for registered users in the FFCC-homepage (www.ffcc.at). To get access to FFCC-homepage contact A. Fürst (Alfred.Fuerst@bfw.gv.at).

FOLIAGE AND LITERARY

SIGNATURE

1	Nicholas	Clarke	Norway
2	Alfred	Fürst	Austria
3	Nathalie	Cools	Belgium
4	Emily	Solly	Switzerland
5	Nils	König	Germany
6	Arne	Verstraeten	Belgium
7	Peter	Waldner	Switzerland
8	Marcus	Schaub	Switzerland
9	Walter	Seidling	Germany
10	Suzanne	Benham	UK
11	Aldo	Marchetto	Italy
12	Hugues	Titeux	Belgium
13	Hans Werner	Schröck	Germany
14	Peter	Hartmann	Germany
15	Henning	Andreae	Germany
16	Andrea	Hölscher	Germany
17	Juan	Molina	Spain
18	Irene	Guerra	Spain
19	Volkmar	Timmermann	Norway
20	Henning	Meesenburg	Germany
21	Vladislav	Apuhtin	Estonia
22	Endla	Asi	Estonia
23	Bruno	De Vos	Belgium
24	Matej	Rupel	Slovenia
25	Aleksander	Marinšek	Slovenia
26	Daniel	Žlindra	Slovenia
27	Anne	Thimonier	Switzerland
28	Andreas	Schmitz	Eberswalde
29	Alessandra	De Marco	Italy
30	Anita	Nussbaumer	Switzerland
31	Pasi	Rautio	Finland
32	Maria	Schmitt	Switzerland
33	Anne-Katrin	Prescher	Germany
34	Till	Kirchner	Germany
35	Päivi	Merilä	Finland
36	Liisa	Ukonmaanaho	Finland
37	Manuel	Nicolas	France
38	Aldis	Butlers	Latvia
39	Toms	Sarkanābols	Latvia
40	Alexandru Luviiu	Ciuvat	Romania
41	Lucian Constantir	Dinca	Romania
42	Carmen	Iacoban	Romania
43	Diana-Maria	Silaghi	Romania
44	Stefan	Leca	Romania
45	Ovidiu	Badea	Romania
46	Radek	Novotný	Czech Republic
47	Anna	Kowalska	Poland
48	Tiina Maileena	Nieminen	Finland
49	Jim	Johnson	Ireland
50	David	Elustondo	Spain

Arne Verstraeten

Suzanne Benham

Andrea Hölscher
Juan Molina

Matej Rupel

Anne Thimonier

Anita Nussbaumer
Pasi Rautio
Maria Schmitt
Anne-Katrin Prescher

Päivi Merilä
Liisa Ukonmaanaho

Alexandru Luviiu

Carmen Iacoban

Radek Novotný

51	Guia	Cecchini	Italy
52	Stefano	Carnicelli	Italy
53	Vít	Šrámek	Czech Republic
54	Mitja	Skudnik	Slovenia
55	Nicole	Wellbrock	Germany
56	Pavel	Pavlenda	Slovakia
57	Danica	Krupová	Slovakia
58	Hans-Peter	Dietrich	Germany
59	Maria	Sokolovska	Bulgaria
60	Miglena	Zhiyanski	Bulgaria
61	Elena	Vanguelova	UK
62	Athanassios	Bourletsikas	Greece
63	Karin	Hansen	Sweden
64	Ülis	Sõukand	Estonia
65	Stefan	Fleck	Germany
66	Mathias	Neumann	Austria

Dietrich

MSF
Stefan

67 IVAN SELETKOVIĆ CROATIA