

**International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests of UN/ECE (ICP Forests)**

**Minutes of the 13<sup>th</sup> ICP Forests Expert Panel on Foliage and Litterfall**

22 participants from 17 countries attended the meeting (Annex 1).

1. The 13th EP on Foliage meeting took place from 9 to 10 April 2013 in Ljubljana, Slovenia.

**Day 1 (Tuesday 9<sup>th</sup> April)**

2. The Chairman (Mr. Pasi Rautio) opened the meeting

3. On behalf of the organizers (Slovenian Forestry Institute) the director Mr. Primož Simončič welcomed the participants and Mr. Daniel Žlindra gave some practical announcements

4. The meeting adopted the attached agenda (Annex 2).

5. The chairman gave an overview on the recent activity taken place in the EP, and the progress in the foliar data base and data quality checks (presentation: “UNECE ICP Forests EP Foliar & Litterfall latest activities”). Recent development in issues concerning litterfall data and database were raised in presentation by co-chair of litterfall Ms. Liisa Ukonmaanaho: “Litterfall in ICP-Forests database – situation in 5.4.2013” (given by P. Rautio).

6. 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](http://www.ffcc.at)):

1. Peter Waldner presented results of the study “Exceedance of critical limits and their impact on tree nutrition”
2. Mathieu Jonard gave a presentation preliminary results of the study “Temporal trends in foliar nutrition at the European scale”
3. Giorgio Matteucci presented the results of the study by Giorgio Matteucci & Bruno de Cinti “Site level comparison of foliar nutrients with litter and soil nutrients”
4. Peter Waldner presented results of the study by Matthias Dobbertin & Peter Waldner “Seed-C – Carbon allocation to fruits and seeds in European forests as a function of climate, atmospheric deposition and nutrient supply”

The complete list of on-going projects evaluating European foliar and litterfall data will be available in the internet, on webpage of ICP Forests discussion group “EP Foliage and Litterfall” (<http://icp-forests.net/group/foliageandlitterfall>). This list will be updated so that interested members can follow which projects are on-going, which projects can still be joined to give an own contribution, which projects are already finalised (results are published) etc. If needed new project can have an own discussion group page, so that only those partners that are interested to contribute to data analyses, data evaluation drafting the article etc., can join the group. Any partner willing to initiate such a single project based discussion group page, is asked to contact the EP chair.

7. Mr. Fürst gave an introduction and historical background for the item “Classification values for foliar concentrations”. The same item was then dealt with in presentations by Hans-Peter Dietrich (“New“ foliar nutrient thresholds - Statistical recompilation of Van den Burg’s data collection by Mellert and Göttlein 2012); by Morten Ingerslev & Karsten Raulund-Rasmussen (Nutrient status in Norway spruce stands on nutrient poor soils in Denmark, presented by P. Rautio); by Pasi Rautio (Foliar classification values: how low is low and how high is high?); and Giorgio Matteucci (Thresholds for nutritional status of European tree species). In the presentations few different possibilities for foliar classification values were presented. A caution was raised not to set any definitive thresholds or limits on the basis of results coming, as an example, from a single plot sampled only once. This is due to the fact that annual variation e.g. in foliar nutrient concentrations, even within a single sample plot, can be quite substantial.

After intensive discussions the EP did not want at this point to set up definitive diagnostical limits or thresholds, or to decide which of the different classifications would be most suitable, as they are in some cases targeted to different audiences and regional scales. However, EP wanted to harmonise the titles of classification values used when classifying foliar concentrations in samples collected in ICP Forests monitoring plots. After detailed discussion EP decided to adopt following terminology for the classification values:

For the nutrient elements (N, P, K, Ca, Mg, Fe, B, Mn, Zn and Cu):

Class 1: Low / deficient

Class 2: Adequate to optimum

Class 3: High / surplus.

For the pollutant elements (S, Cd, Pb):

Class 1: Low

Class 2: Medium

Class 3: High to toxic

An “explanatory note” will be prepared, to be found in the FFCC-homepage ([www.ffcc.at](http://www.ffcc.at)), to present the background and reasoning behind above terminology.

8. Mr. Fürst gave a presentation about: “How to prepare samples for the Needle/Leaf Interlaboratory Comparison Tests”. There is a need to collect ringtest samples from all participants, because the collection of the test samples is expensive and the ringtest program after FutMon is free financed (participation fee, advertising, selling reference material and last but not least sample collection from the participants). In the last ten years the following countries collected ringtest samples: Austria (16 samples), Germany (5 samples), Finland (3 samples) and one sample per Belgium, Croatia, France, Italy, Hungary, Romania, Switzerland, Turkey and United Kingdom.

The procedure of sample collection and preparation is described on the FFCC Webpage (<http://bfw.ac.at/rz/bfwcms.web?dok=9193>). In case you plan to prepare a test sample-please, contact Alfred Fürst ([alfred.fuerst@bfw.gv.at](mailto:alfred.fuerst@bfw.gv.at)).

9. The chairman closed the meeting for the first day

**Day 2 (Wednesday 10<sup>th</sup> April)**

Day 2 was a combined ring-test results session for Foliar/litterfall, Deposition and Soil.

10. Mr. Fürst presented the results of the 14<sup>th</sup> and 15<sup>th</sup> Needle/Leaf Interlaboratory Comparison Tests.

In the 3rd Labhead Meeting Arcachon/France a maximum acceptable limit of quantification (LOQ) for all elements were fixed. This was needed to avoid too high LOQ (especially for Cu, Cd, and Pb), because of the use of not sensitive enough multi-element methods (mostly ICP-AES). It seems that this problem is fixed now – in the 13<sup>th</sup> Test 42 results; in the 14<sup>th</sup> Test 19 results and in the 15<sup>th</sup> Test only 4 results were above the maximum acceptable limit of quantification. In future test there will be an additional warning, if the submitted LOQ is higher than the maximum acceptable LOQ.

In both tests more than 60 laboratories from 28 countries participate. The comparability of both tests was checked with a blueberry leaf sample. This sample was analyzed as test sample in both tests; the results were – as expected – identically.

The results of the 14<sup>th</sup> Test were bad – most of the parameters show more than 10% non tolerable results. Especially potassium shows a high percentage (21% of the results) outside of the tolerable limits. The results of the 15<sup>th</sup> Test were much better only for sulphur (13.9), calcium (12.1) and potassium (18.0) a higher percentage of results outside of the tolerable limits can be found. Some laboratories failed with the same elements in both tests (three labs failed with K, two labs failed with Ca and one lab failed with Mg and P). The reason for the high percentage of non tolerable results for potassium can be found in element losses (dry ashing method), calibration errors, chemical interferences (Flame-AAS) and in ionization interferences (ICP-AES).

A re-qualification is only needed for laboratories, if monitoring results from growing season 2012 will be submitted to PCC in autumn 2013. The deadline is the 1<sup>st</sup> of October 2013. Mr. Fürst pointed out that for the re-qualification the submission of e.g. printouts, calibration, dilution factors are also necessary. A recalculation of the results should be easily possible with the submitted documents. It is also recommended to use the labcode in all communications!

The reasons for the re-qualifications in the 14<sup>th</sup> test were calibration errors (3 labs), change of the method (3 labs), technical problem (2 labs), data transcription error (2 labs), too high LOQ (2 labs), missed data submission deadline (2 labs), contamination (one lab) and no dry matter correction (one lab). A qualification is always valid for the combination of element, the pretreatment and the determination method!

There are a lots of errors detected in the submitted LOQ Files for foliage from 2009 and 2010. The final data check of these files is open.

Mr. Fürst presented the new web-interface for foliage and litterfall ringtests. The update was needed to harmonize the registration-, data submission- and the result pages and to collect the billing information for the participation fee and for the creation of online qualification reports. The interface offers the possibility for first data checks for errors (decimal errors, non plausible results, max LOQ) before the final evaluation.

11. End of the ring-test session

Expert Panel wants to warmly thank the organisers of the meeting, Daniel Zindra and his Slovenian colleagues from Slovenian Forestry 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](http://www.ffcc.at)). To get access contact A. Fürst (Alfred.Fuerst@bfw.gv.at).