



FutMon (Life+) Action D2: Nutrient cycling and critical loads

Present status

Tampere 16-17 Feb 2010

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Finnish Forest Research Institute



Meeting of FutMon Action D2 and ICP Forests EP Foliage & Litterfall



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Agenda

1. Opening of the meeting
2. Status of the D2-action at the moment:
What has happened since the start of the FutMon:
How many partners have already done the field work and how many are starting in 2010
What are the questions/problems that have arisen so far
Ground vegetation
Litterfall
Foliar
3. What remains to be done by the end of 2010
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Data delivery (deadlines set by vTI database)
4. Reporting and dissemination of the results
5. Quality issues connected to Action D2
Ring tests
FutMon field protocol / ICP Forests manual update
6. Any other business
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ACTION GROUP D2: Nutrient cycling and critical loads

Description:

This Action Group is a demonstration project to be carried out on a limited number of IM1 monitoring plots (209 plots). **It aims at the refinement and development of monitoring methods in the field of nutrient cycling and critical loads.** Data collection is included under Action Group D2, and the related coordination and evaluation is included in Action C1-Fol1-10(FI).





Photo: Maija Salemaa





Photo: Pasi Rautio





Photo: Pasi Rautio



ACTION GROUP D2: Nutrient cycling and critical loads

Methods employed:

This action will only be conducted on plots on which the full set of surveys from Action Group IM1 is carried out (exception: no passive samplers in countries of Northern Europe)

In addition, surveys specifically conducted within this action:

- Methods defined in ICP Forests Manual Chapter 11 “**Litterfall**” (mass and element concentrations)
- Methods defined in ICP Forests Manual Chapter 3 “**Soil solution**” (chemical composition)
- More **intensive foliar surveys** (all leaf age classes, estimation of foliage mass, leaf mass per area and leaf area index).
- **Nutrient budget of ground vegetation.**



Information needs:

Soil, soil solution, deposition, litterfall, foliage, ground vegetation

- Macro nutrients
- Micro nutrients?
- Heavy metals?

Most of the parameters needed are collected in “normal monitoring” or already in database(s)

- BioSoil data?

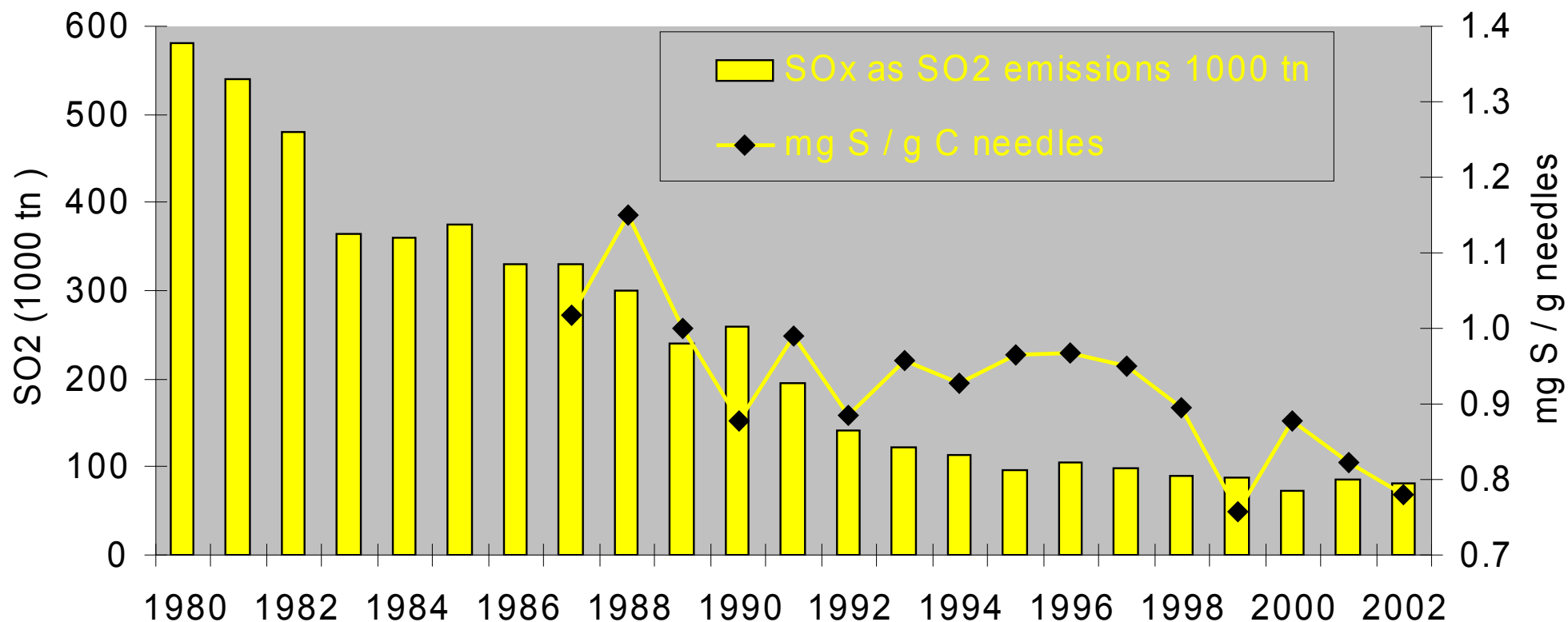


ACTION GROUP D2: Nutrient cycling and critical loads

New parts (non ICP Forests):

- Nutrient budget of ground vegetation
- More intensive foliar surveys. **ONLY IN CASE OF EVERGREENS (in deciduous trees: FutMon method = ICP Forests method)!**

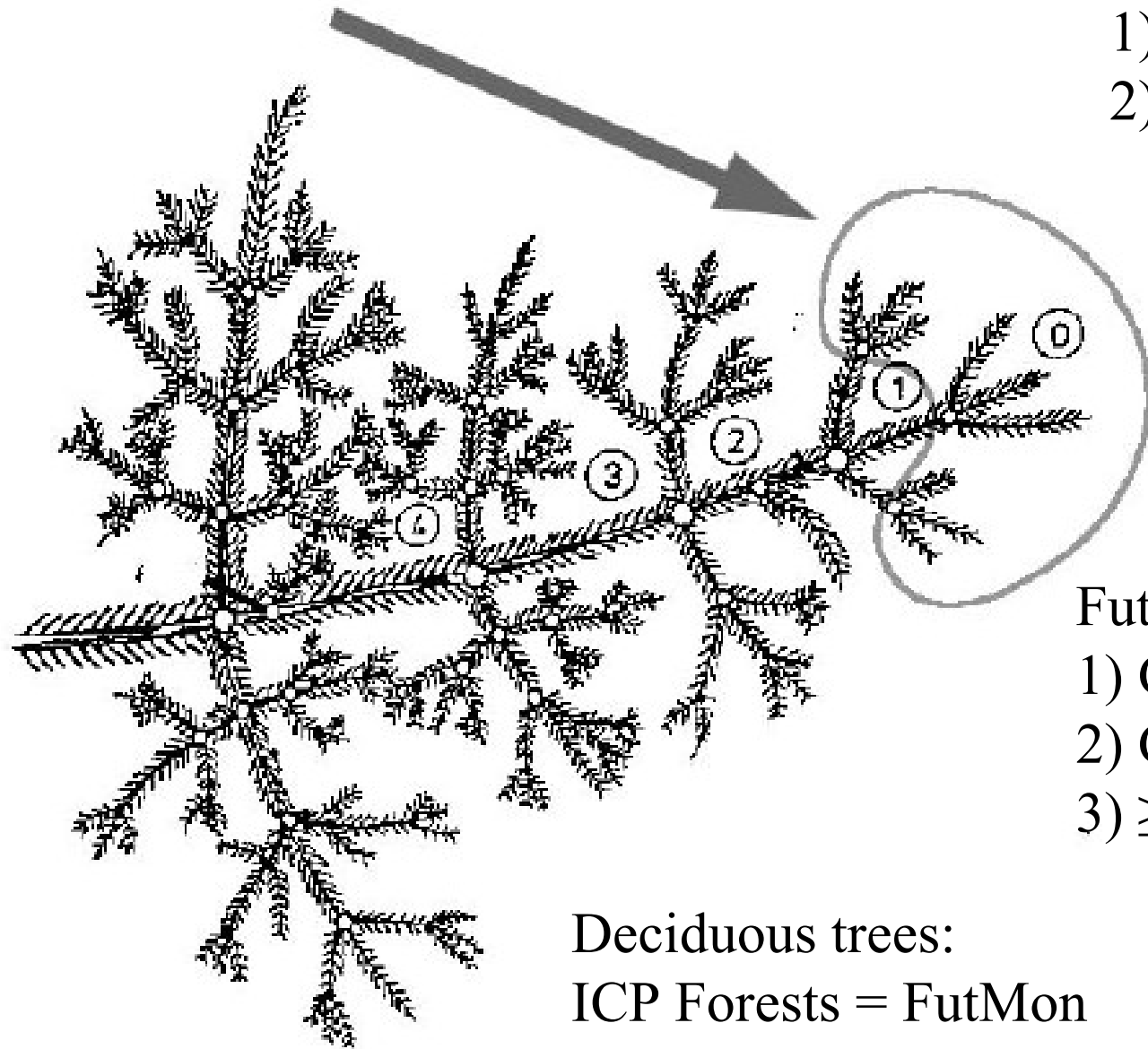




Sulphur emissions in Finland during 1980-2002 and S in pine C-needles 1987-2002 in selected ICP Forests Level I plots



Choice of needles



ICP Forests:
1) C-foliage
2) C+1-foliage

FutMon:
1) C-foliage
2) C+1-foliage
3) $\geq C+2$ -foliage

Deciduous trees:
ICP Forests = FutMon



ACTION GROUP D2: Nutrient cycling and critical loads

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FutMon field protocol

- 1st version circulated within a small group of experts in Nov 2008
- Edited version to a larger group Nov-Dec
- 3rd version sent to every EP member before Christmas 2008
- Discussion in Hamburg Jan 2009
- 4th version February-March 2009
- Comments from EP ground veg. & biodiversity
- Task Force 2009?



3.4 Assorting species into functional groups

- 1) Bryophytes (mosses, liverworts and hornworts)
- 2) Lichens
- 3) Ferns (all Pteridophytes)
- 4) Grasses (Poaceae), including sedges (Cyperaceae) and rushes (Juncaceae)
- 5) Herbs
- 6) Deciduous shrubs, including deciduous tree seedlings <50 cm height
- 7) Evergreen shrubs, including evergreen tree seedlings < 50 cm height
- 8) Rest*

* Group "rest" (code 8 in the formats) is used in case two (or more) groups are pooled for the chemical analysis due to small amount of available biomass. The biomass results are, however, reported for the actual functional groups.

Questionary

1) Is the field sampling for "Nutrient budget of ground vegetation" already conducted?

If yes, on how many plots?

If not, how many plots remains to be done?

2) Is the field sampling for "Foliar survey (incl. more intensive foliar survey)" conducted?

If yes, on how many plots?

If not, how many plots remains to be done (evergreens / deciduous)?

3) Is "litterfall" and "soil solution" surveys going as planned?

4) Any problems / questions?



	Country	AB No	No of plots (Life+ appl.)	Ground vegetation	Intensive foliar survey	Litterfall & soil sol. NOTE
1	AT Austria	2	6	6	6	6
2	BE, FL Belgium-Flanders	3	5	0 (5)	5	5
3	BU Bulgaria	5	3	0 (3)	0 (3)	3* *prolems with litter fractions, no soil sol. in 2009
4	CZ Czech Republic	7	10			
5	DK Denmark	8	6	6	6	6
6	EE Estonia	9	5	1	2 (5)	1 & 5
7	FI Finland	10	18	18	18	18
8	FR France	11	10			
9	GR Greece	12	3	3	2 (1)	3
10	HU Hungary	13	2			
11	IE Ireland	14	3	0 (3)	0 (3)	3
12	RO Romania	20	4	0 (4)	3 (1)	4
13	SK Slovakia	21	4	4	4	4* *1 soil solut. reinstalled 2009
14	SI Slovenia	22	2	2	2	2
15	ES Spain	23	30 / 13	13*	13	13 & 5** *spring & autumn, ** not enough sample in south
16	SE Sweden	25	12	0 (?)	12*	4** * ongoing, **core plots
17	UK United Kingdom	26	6	0 (6)	2 (6)	6
18	BB Germany, Brandenburg	27	4	4*	0 (4)	4 *1m ²
19	BW Germany, Baden Württernberg	28	5			
20	BY Germany, Bayern	29	10	10	10	10
21	NWD Germany, Northwest	30	9	0 (9)	9	9
22	MV Germany, Mecklenburg-Vorpommern	31	2	0 (2)	0 (2)	2
23	NW Germany, Nordrhein-Wesfalen	32	4			
24	RP Germany, Rheinland-Pfalz	33	3	0*	3	3 *Computed using Phytocalc programme
25	SH Germany, Schleswig Holstein	34	1			
26	SL Germany, Saarland	35	1	1*	1	1 * No ground vegetation or shrub layer
27	SN Germany, Sachsen	36	2	2	2	6 & ?
28	TH Germany, Thüringen	37	3	0 (3)	3	3
29	IT Italy	40	22 / 11	0 (11)	19 (3)	6 & 11

(X) remains to be done

Answer received

No answer

Withdrawn

Total no of partners: 29		Tot no of plots	
	of which 11 German Länders	Life+:	195
	--> 19 different countries	Now:	?

Summary (of the 23 partners responded)

- Ground vegetation: 13 partners are ready / 10 to be done
- Foliar sampling: 14 done / 9 to be done
- Litterfall & soil solution generally going as planned



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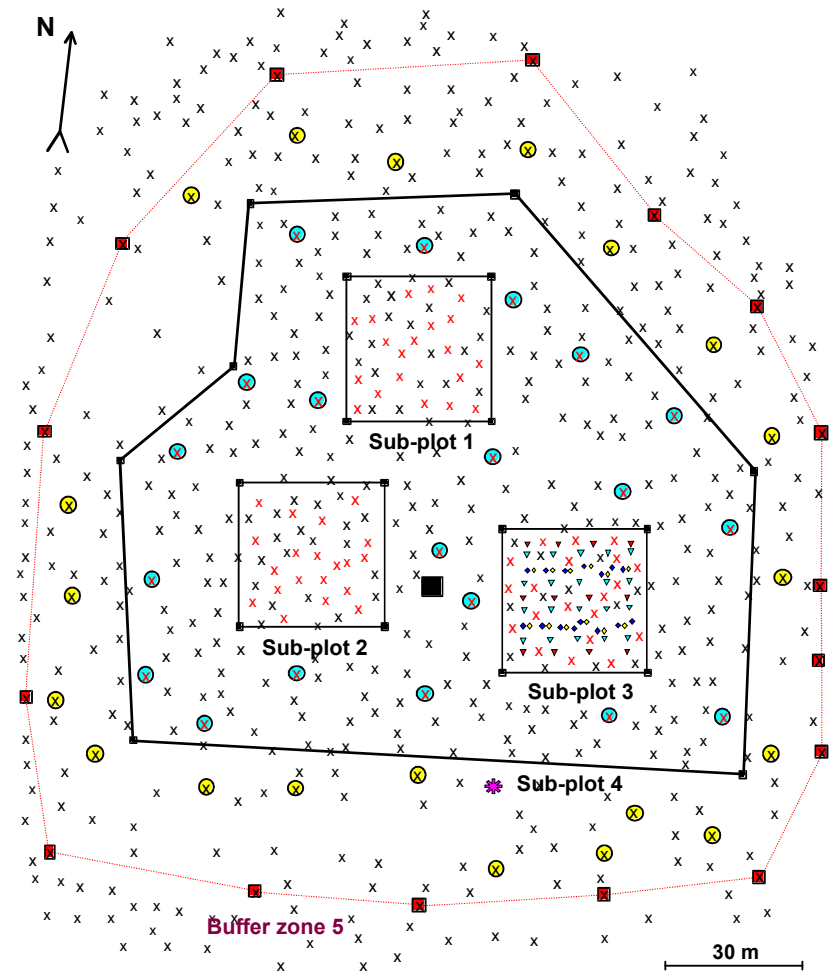
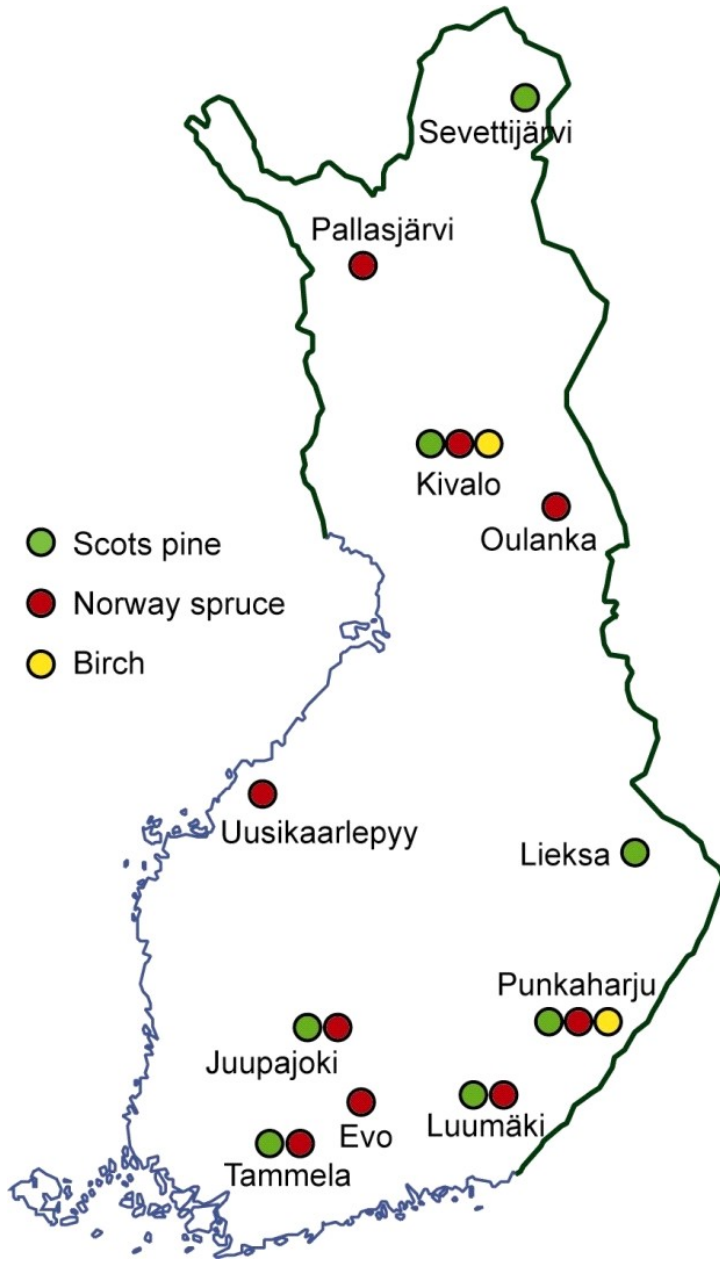


Ground vegetation sampling

Example from Finland:

- July-August 2009
- 18 plots





- Boundary of the sub-plot
- ⋯ Boundary of the buffer zone
- x Tree
- ⊙ Sample tree for age determination
- × Sample tree for assessment of crown condition
- ⊗ Sample tree for needle chemistry
- ▽ Stand throughfall sampler
- ▽ Litterfall sampler
- ◆ Gravity lysimeter
- ◇ Suction-cup lysimeter
- ✱ Meteorological station



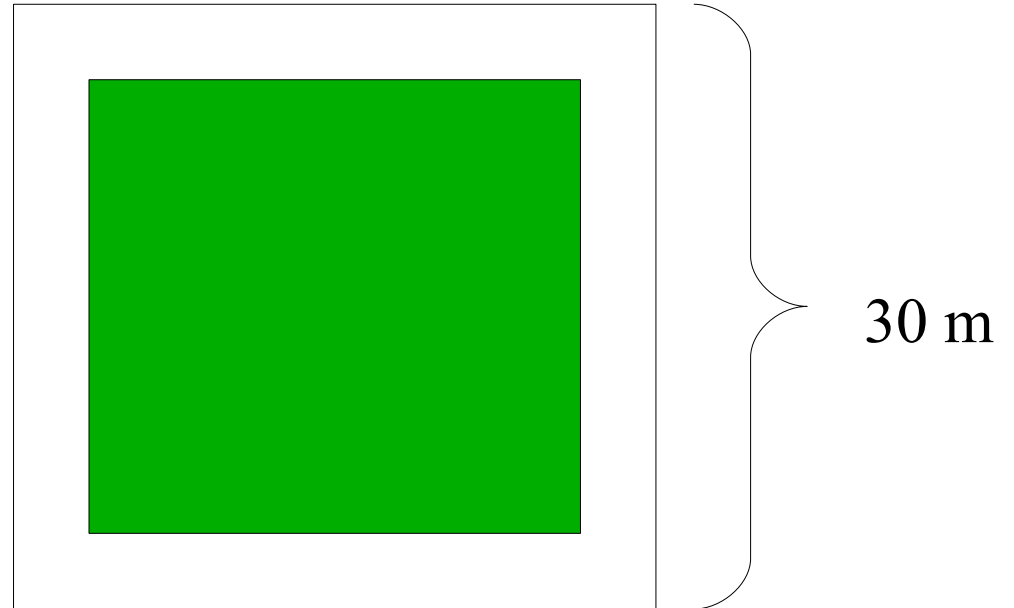
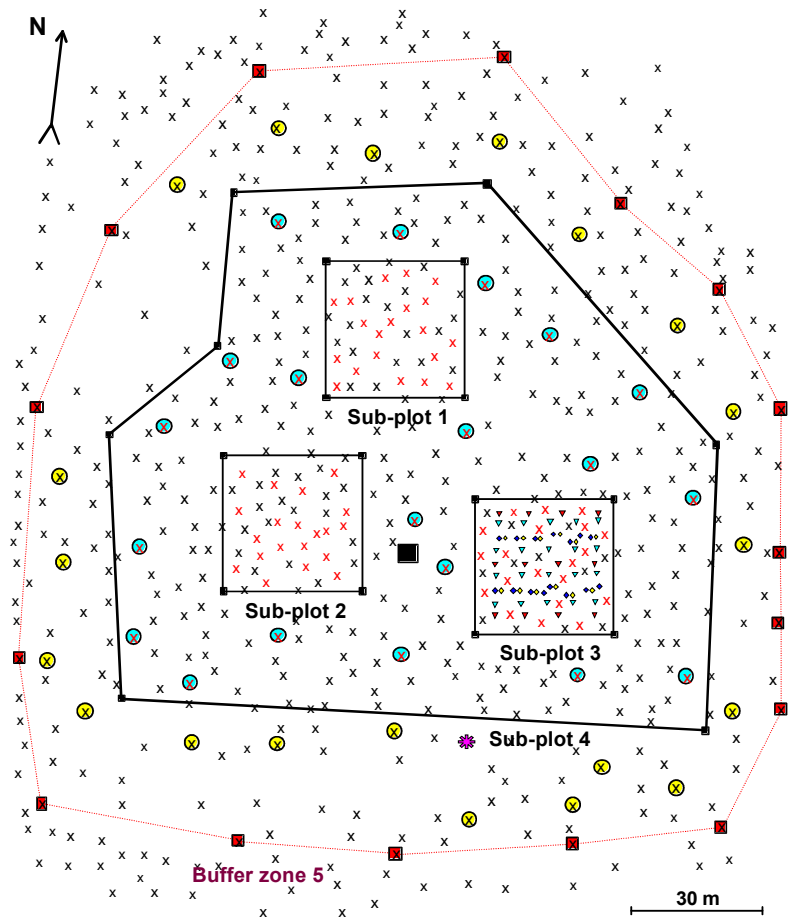
Photo: Pasi Rautio





Photo: Maija Salemaa





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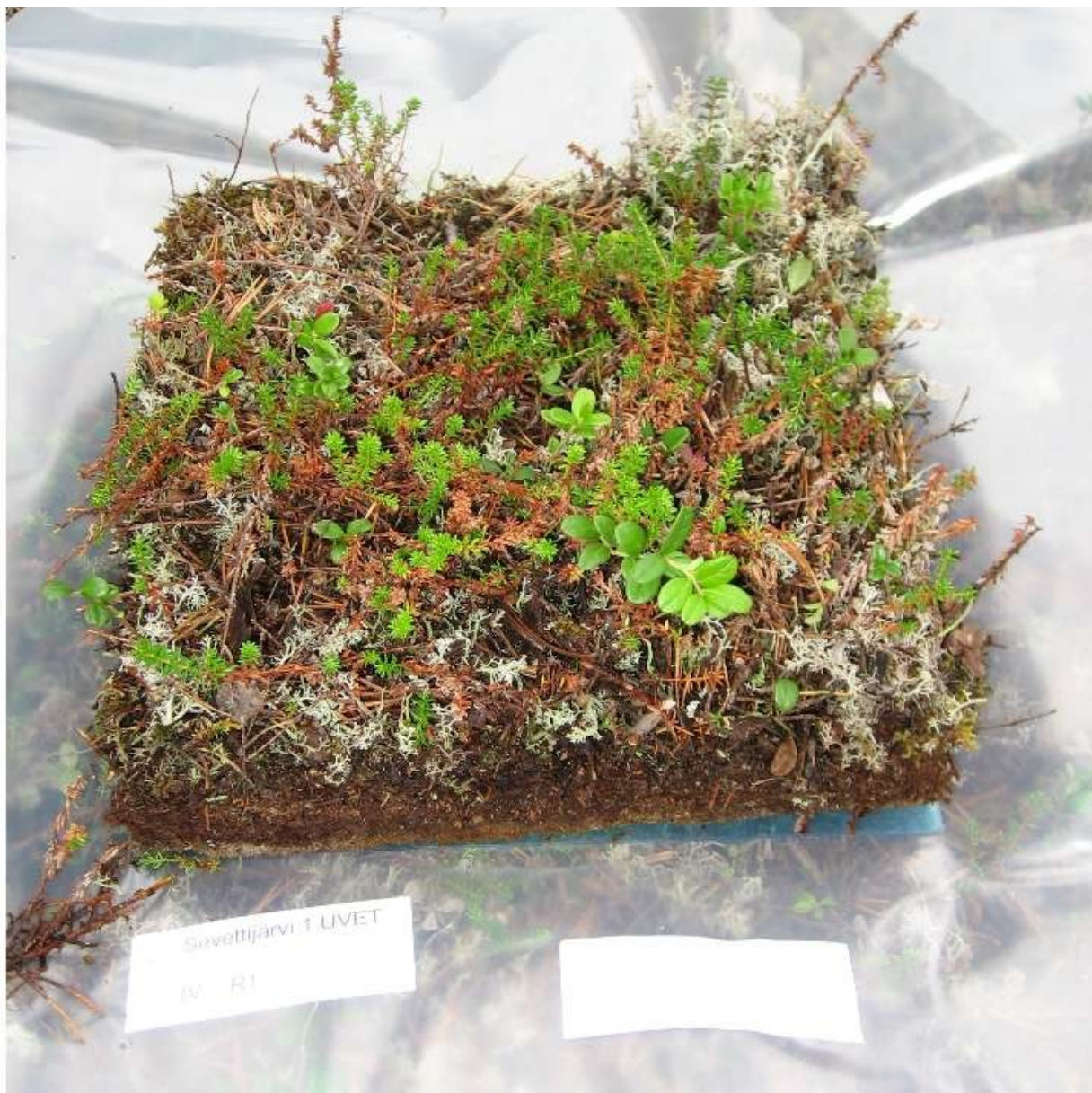




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Problems / questions (litterfall):

Austria:

Leaf area determination on litter is not feasible, as leaves (and needles) will be broken when sampled

Germany Sachsen:

4) Problems / Questions?

Include litterfall samples in Foliar ring tests! Its a real analytical difference between the categories fruits - woody debris – leafs

Others:

Descriptions of fractions is unclear?

Mass of leaves at what dried temperature to report

Problems of area measurements with broadleaf vs conifers.



Problems / questions (ground vegetation):

Germany Saarland:

On our plot exists no ground vegetation and a shrub layer is also missing. A relevé counts less than 10 *Quercus petraea* sprouts on 400 m². The sprouts survive only two or three month before they are feeded by insects or birds. It isn't possible to sample enough material for Analysis.

Greece:

4. I have one question with regard to ground vegetation survey. Sometimes the quantity is little. It is enough for some analyses but not for others. Is there any priority in terms of analysis?

Germany, Mecklenburg-Vorpommern

Is the calculation of nutrient budgets by software solutions (Phytocalc) based on the results of the ground vegetation assessment alloud? I couldnt find anything related to this topic in the field protocol.

Bavaria:

(4) Questions to ground vegetation budgeting:

- (a) QA- aspect: how to deal with accuracy, error and representativity of the methods (Are estimates based on intensive collections performed or foreseen in order to adapt the method)
- (b) Are restrictions for composite samples across functional groups necessary (data analysis)
- (c) What are the strategies and hypothesis of data use (=data analysis)

Italy

GROUND VEGETATION SAMPLING IN OR OUT OF THE LEVEL II PLOTS. BIOMASS ASSESSMENT OF GROUND VEGETATION TO DERIVE THE BUDGET.

ROLE OF PROPER SAMPLING OF FOLIAGE IN OVERALL DATA QUALITY FOR NUTRIENTS

Problems / questions (litterfall / foliage manual):

Germany Nothwest:

4) Have you had the kind of problems in committing above field work, or are there some questions specific for D2-action, that you would like to be discussed in Tampere D2-session?

We would like to suggest some changes in the **litterfall** manual and litterfall data submission forms (from 2009 on)

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- Clear definition/description of litterfall fractions and mandatory fractions in the litterfall field protocol

And some ideas for "**Foliar survey** (incl. more intensive foliar survey)":

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Data submission (to vTI)

- 2009 Data submission: 01/09/2010 – 30/11/2010
- 2009 Final data validation and reporting: 01/12/2010 – 31/12/2010



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ACTION GROUP D2: Nutrient cycling and critical loads

Expected results (quantitative information when possible):

- Plots equipped with related monitoring devices
- Data on nutrient fluxes and deposition as a basis for the calculation of critical loads and as a basis for deriving information on nutrient fluxes through the soil:
 - ♦ loss of base cations
 - ♦ loss of nitrogen / nitrate flux to ground water
 - ♦ input/output balance of individual nutrients
- **Estimations of nutrient budgets in vegetation (content and output)**
- Estimations of critical loads on the plots
- Estimation of critical load exceedances on the plots
- Predictions on whether the critical loads will change if the vegetation on the plots changes

Biomass Equations for Scots Pine and Norway Spruce in Finland

Jaakko Repola



SILVA FENNICA

Monographs 4 · 2005

Dimitris Zianis, Petteri Muukkonen, Raisa Mäkipää
and Maurizio Mencuccini

Biomass and Stem Volume Equations for Tree Species in Europe



Table 2. Number of compiled biomass equations according to tree species and tree component. For the abbreviations see Table 1.

	Branches			Folige					Stem park							Total				
	AB	ABW	BR	CO	CR	DB	FL	FL(i)	RC	RF	RS	RT	SB	SR	ST		SU	SW	TB	TW
<i>Abies balsamea</i>	–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	4
<i>Abies</i> spp.	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
<i>Acer pseudoplatanus</i>	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
<i>Alnus glutinosa</i>	2	1	3	–	–	–	2	–	–	–	–	–	–	–	3	–	–	–	–	11
<i>Alnus incana</i>	2	–	2	–	–	–	2	–	–	–	–	–	–	–	2	–	–	–	–	8
<i>Arbutus unedo</i>	1	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
<i>Betula pendula</i>	1	1	2	–	–	–	1	–	–	–	–	2	–	–	2	–	–	–	–	9
<i>Betula pubescens</i>	1	–	1	–	–	–	1	–	–	–	–	–	2	–	1	–	2	–	–	8
<i>Betula pubescens</i> ssp. <i>czerepanovii</i>	–	–	1	–	–	1	1	–	–	–	–	–	–	–	1	–	–	–	–	4
<i>Betula</i> spp.	–	4	3	–	2	4	2	–	–	–	–	1	4	–	1	1	5	–	–	27
<i>Eucalyptus</i> spp.	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>Fagus crenata</i>	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1
<i>Fagus moesiaca</i>	1	–	1	–	–	–	1	–	–	–	–	–	–	–	1	1	–	–	–	5
<i>Fagus sylvatica</i>	8	4	7	–	4	–	6	–	1	1	1	4	2	–	8	–	2	–	–	48
<i>Fraxinus excelsior</i>	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
<i>Larix sibirica</i>	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	2
<i>Larix</i> spp.	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>Picea abies</i>	16	1	27	–	17	13	28	–	2	–	2	7	14	1	16	1	12	3	3	159



Biomass Equations for European Trees: Addendum*

Petteri Muukkonen and Raisa Mäkipää

*Zianis et al 2005 Silva Fennica monographs



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Reporting

- Originally foreseen in the end of 5 year project
- Now in the end of 2010
 - But D2 needs D3-results
- In depth analysis planned in ForEU project



ForEU

Action Group E-ECyc: Evaluations related to forest nutrition and critical loads and limits

- 1)E-ECyc-10(FI): Coordination of the action group and estimation of forest nutrition status and critical loads
- 2)E-ECyc-30(NWD): Effects of environmental change and forest management on forest nutrition
- 3)E-ECyc-8(DK): Tree response to critical soil solution element concentrations and ratios
- 4)E-ECyc-1a(DE): Empirical critical deposition levels for soil and soil solution status
- 5)E-ECyc-41(FR): Critical loads and dynamic modelling
- 6)E-ECyc-1b(DE): Calculation of total deposition



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