

26th Task Force Meeting of ICP Forests, 31 May - 1 June
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Item 6: Forest Monitoring and cooperation with FutMon

Manual Part X: Sampling and Analysis of Soil

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Revision process between 2006 and 2010

- Version 5 = Last adopted version (June 2006)
 - Used in the Forest Focus BioSoil demonstration project
- Version 6
 - Version 6.1
 - Presented and discussed at the 16th FSEPM, Brussels, Dec'09
 - Version 6.2
 - Prepared for discussion at Tampere Meeting, Feb '10
 - Includes changes agreed upon at the 16th FSEPM
 - Version 6.3
 - FSCC/chair FSEP did not receive additional comments on Version 6.2 after Tampere Meeting
 - Careful check by FSCC/chair FSEP on inconsistencies in Version 6.2
 - Final draft (part X) for adoption ICP Forests Task Force 2010



Revised structure 2010

- Structure following proposal by QA Committee
- Manual is built on 4 clearly defined surveys:

Soil survey	Level I	Level II	Level II core
1. Pedological characterisation	Mandatory (once at plot installation)		
2. Soil sampling at fixed depths	Mandatory (every 10-20 years)*		
3. Soil sampling for bulk density at fixed depths	Mandatory		
4. Sampling for measurement of Soil Water Retention Characteristic (SWRC)	Optional	Optional	Mandatory

* Due to last days discussions the time interval changed from 10 yrs to 10-20 yrs

* pan-European synchronisation of the soil survey within a period of 3 yrs is essential

- Manual includes more summary tables
=> on M/O surveys, M/O parameters, reference methods



Revised structure: Table of Contents (1/2)

1. INTRODUCTION
2. SCOPE AND APPLICATION
3. OBJECTIVES
4. LOCATION OF MEASUREMENTS AND SAMPLING
4.1. Sampling design at plot level
4.1.1. Pedological characterization of the plot
4.1.2. Soil sampling at fixed depths
4.1.3. Sampling at fixed depth for soil bulk density
4.1.4. Sampling for soil moisture measurements
4.2. Sampling equipment
4.2.1. Pedological characterisation
4.2.2. Soil sampling at fixed depths
4.2.3. Sampling of undisturbed soil core cylinders
4.3. Sample collection
4.3.1. Pedological characterisation and profile pit sampling
4.3.2. Sampling at fixed depths
4.3.4. Cores for bulk density and soil moisture retention measurements
4.3.5. Excavation method for sampling for bulk density
4.4. Sample storage and transport
4.5. Long-term storage of soil samples



Revised structure Table of Contents (2/2)

5. MEASUREMENTS

5.1. Physical characterization

5.1.1. Amount of organic layer

5.1.2. Particle size distribution

5.1.3. Bulk density of the total mineral soil

5.1.4. Coarse fragments

5.1.5. Combined approach to estimate bulk density, coarse fragments and fine earth stock in stony soils

5.1.6. Measurement of the soil moisture retention characteristic (SMRC)

5.2. Chemical characterization of collected samples

5.2.1. Selected key soil parameters for the Level I and II Survey

5.2.2. Reference analytical methods

5.3. Data quality requirements

5.3.1. Plausibility limits

5.3.2. Data completeness

5.3.3. Data quality objectives or tolerable limits

5.3.4. Data quality limits

6. DATA HANDLING

6.1. Data submission procedures and forms

6.2. Data validation

6.3. Transmission to co-ordinating centres, with timetable and rules

6.4. Data processing guidelines

6.5. Data reporting

7. REFERENCES

8. ANNEXES

Main changes 2006 => 2010

1. Quality chapter for the laboratories
Centralised for all surveys in new Part III on QAQC in labs
2. Forms and explanatory items
Centralised for all surveys
3. FutMon D3 protocol on Soil Moisture Retention Characteristic has been integrated
4. Explicit references to BioSoil have been removed
5. Some changes to M/O parameters
Following decisions 16th FSEPM:
 - “It should be possible to calculate OC stocks till a depth of 40 cm on all Level I and II plots” following reporting obligations of the Kyoto protocol (*see further*)
 - “All laboratory analyses on the samples of the genetic horizons, taken from the profile pit for soil characterisation are optional”
6. Location of sampling (*see further*)



Main changes 2006 => 2010

8. Annex 1 on laboratory methods:

- Changes and clarifications discussed and agreed on 16th FSEPM
- Update of ISO reference for pH
- All other changes, updates of analytical methods are put into *testing phase* for update 2013

9. New annexes 2 till 7:

- Annex 2: Guidelines for forest soil description
Based on BioSoil experience
- Annex 3: Recommendations for locating and describing a soil profile
- Annex 4: List of field equipment
- Annex 5: Additional information on colour measurements
- Annex 6: Guidelines for field estimates of textural classes
- Annex 7: Detailed definitions, rules and conventions on master and subordinate horizon designations



Consequences of decision "OC stocks till 40 cm"

Parameter	Layer		Update 2006		Update 2010	
			Level I	Level II	Level I	Level II + core
Organic Carbon	Org. layer	OL	-		-	
		OF, OH, H	Mandatory		Mandatory	
	Min. soil	M01	Mandatory		Mandatory	
		M12	Mandatory		Mandatory	
	M24	Optional		Mandatory		
Coarse fragments	Min. soil	M01	Mandatory		Mandatory	
		M12	Optional		Mandatory	
		M24	Optional		Mandatory	
Bulk density	Min. soil	M01	Mandatory		Mandatory	
		M12	Optional		Mandatory	
		M24	Optional		Mandatory	
Org. Layer mass	Org. layer	OL	Optional		Optional	
		OF, OH, H	Mandatory		Mandatory	



Location of sampling

Objective	Location of sampling regards the plot area	Sampling design	N° of sampling points	N° of soil layers per point	N° of soil samples per layer and point
<u>Pedological characterization</u>					
Level I	Representative for dominant soil type within the plot area	Judgemental	≥1	= N° of horizons	≥1
Level II	Buffer zone	Judgemental	≥1	= N° of horizons	≥1
<u>Soil sampling at fixed depth</u>					
Level I	Sampling sites should be located within the plot area.	Judgemental	≥ 5 (but on stony soils for optional depth layers ≥ 3)	3 to 8	1
Level II	Sampling sites should be located within the plot area or if not feasible, in the buffer zone of the plot.	Random design or systematic design with a random component.	≥24	5 to 8	1
<u>Sampling at fixed depth for soil bulk density</u>					
Level I	Not specified	Not specified	0 to 5	0 to 5	0 to 1
Level II	Not specified	Not specified	5	3 to 5	1
<u>Sampling for soil water measurements</u>					
Level II core	Within the plot	In vicinity of field soil moisture probes	3	3 to 7	≥1



More information on Soil Manual revision

See:

- <http://fsc.inbo.be>
 - Manual
 - Update 2006
 - Main changes between version 6.1 and 6.2
 - Final draft for adoption TF2010
 - Expert Panel Meetings
 - Minutes of the 16th FSEPM, Brussels, Dec 2009
- <http://www.futmon.org>
 - Results - Field protocols
 - Determination of the Soil Water Retention Characteristic
 - Events – Previous events
 - Minutes of the 16th FSEPM, Brussels, Dec 2009
- <http://www.icp-forests.org>
 - ICP Forest Manual
 - Manual Part IIIa update 2006
 - Manual revision 2010
 - Final draft Part X for adoption TF2010



- Discussion
- The Expert Panel on Soil and Soil Solution invites the Task Force to adopt the revised Part X on Sampling and Analysis of Soil

