

# Exchangeable cations and exchangeable acidity

*How extraction ratio influence on the results?*

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# Methods

## 1. Metla-method

- 15 g mineral soil sample / 3.75 g organic soil sample
- 150 ml BaCl<sub>2</sub>-solution
- equilibrium over night
- shake 2 hours
- filtration (in Rovaniemi after centrifugation)
- measurement
  - **extraction ratio for mineral soil 0,1 g/ml**
  - **extraction ratio for organic soil 0,025 g/ml**

## 2. FSCC-manual/Old method (6/2003)

- 2,5 g soil
- 30 ml BaCl<sub>2</sub>-solution
- shake for 1 h
- centrifugate
- repeat addition of BaCl<sub>2</sub>, shaking and centrifugation twice more
- make up 100 ml volume in volumetric flask  
→ **extraction ratio 0,028 g/ml**

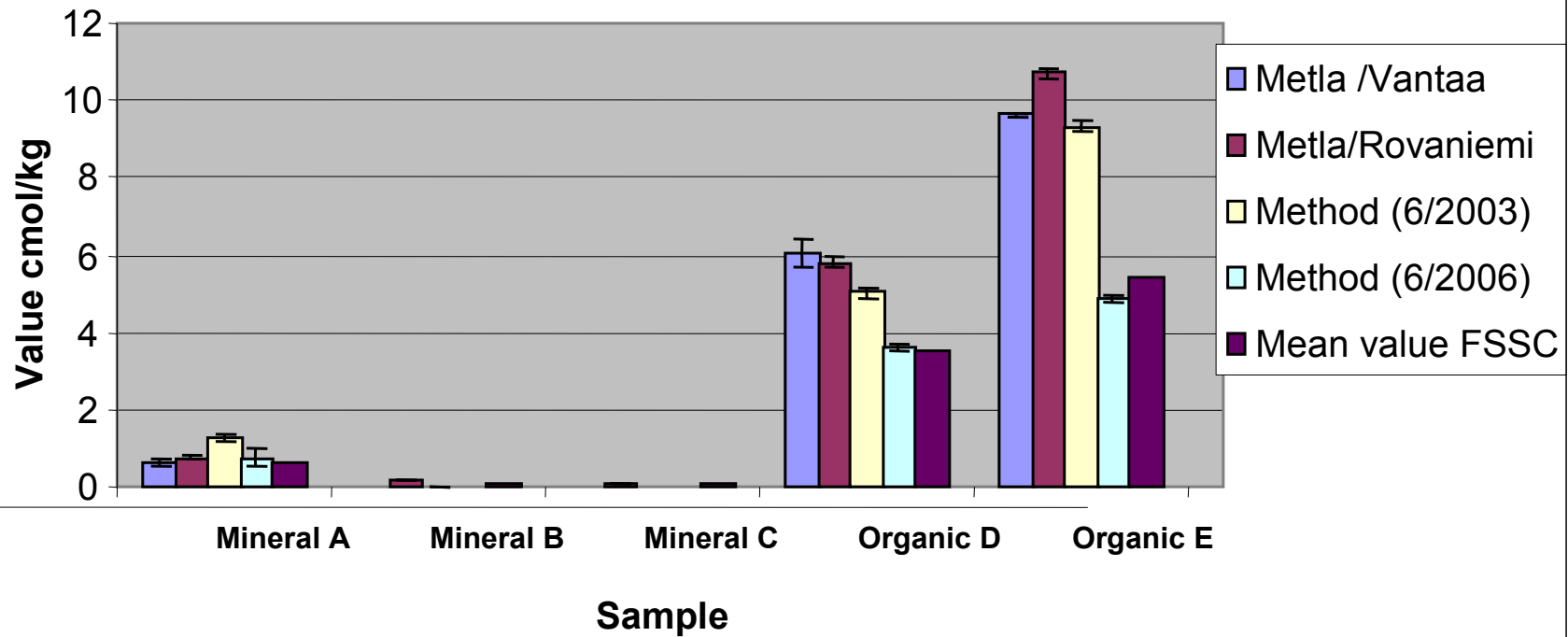
## 3. FSCC-manual/New method (6/2006)

- 2,5 g soil
- 30 ml BaCl<sub>2</sub>-solution
- shake for 2 h
- centrifugate
- make up 100 ml volume in volumetric flask  
→ **extraction ratio 0,083 g/ml**

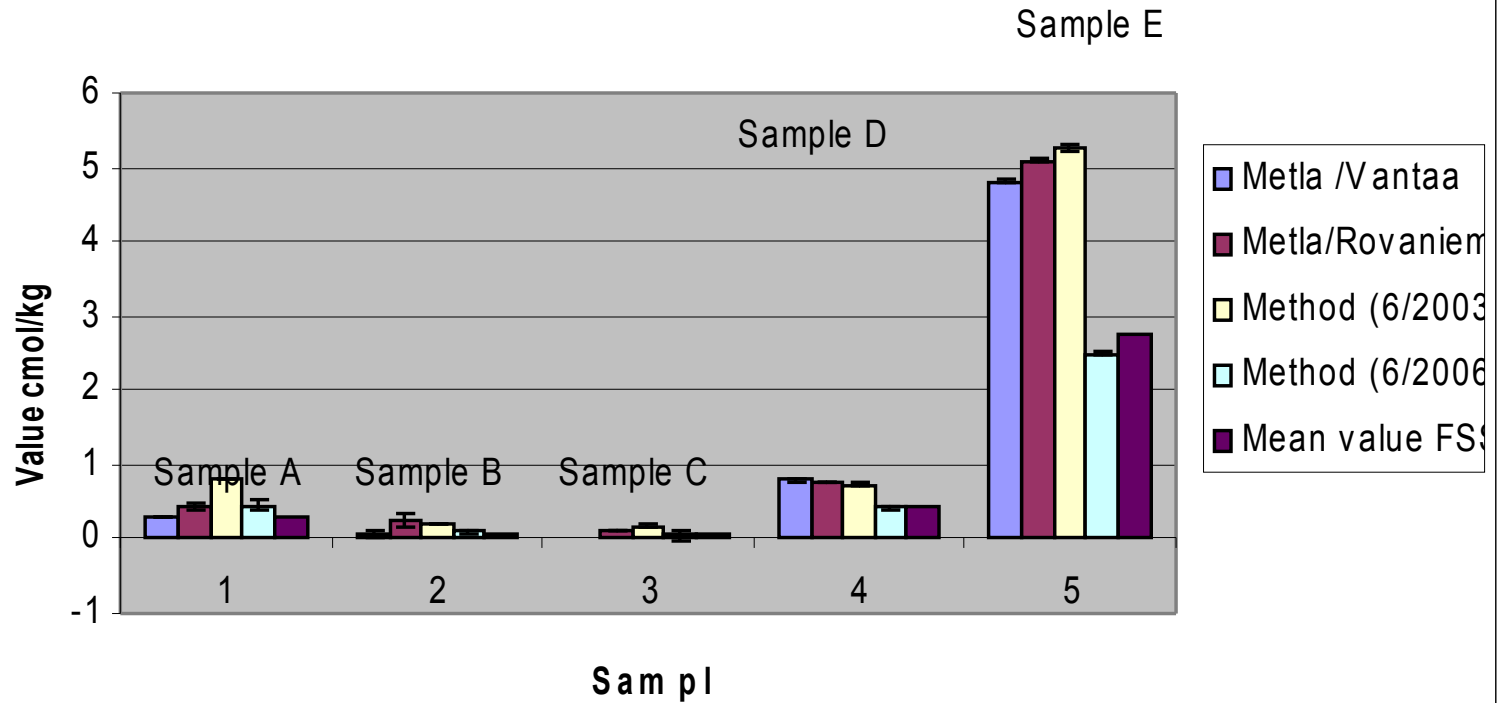
# Exchangeable Acidity

Sample	n	Method		Difference, %	Mean in Report	Std
		Our method cmol(+)/kg	SA10 (6/2003) cmol(+)/kg			
E (organic, 4th FSCC)	1	4.56	4.22	8	4.06	
C (organic, 3th FSCC)	1	12.8	13.4	-4	8.08	3.29
Finnish organic soil	11	18.7	19.2	-3		0.3
A (mineral, 4th FSCC)	1	<0.25	<0.25		0.27	
A (mineral, 3th FSCC)	1	1.16	1.48	-22	1.27	
B (mineral, 3th FSCC)	1	<0.25	<0.25		0.18	
Finnish mineral soil	11	3.2	3.9	-18		0.3

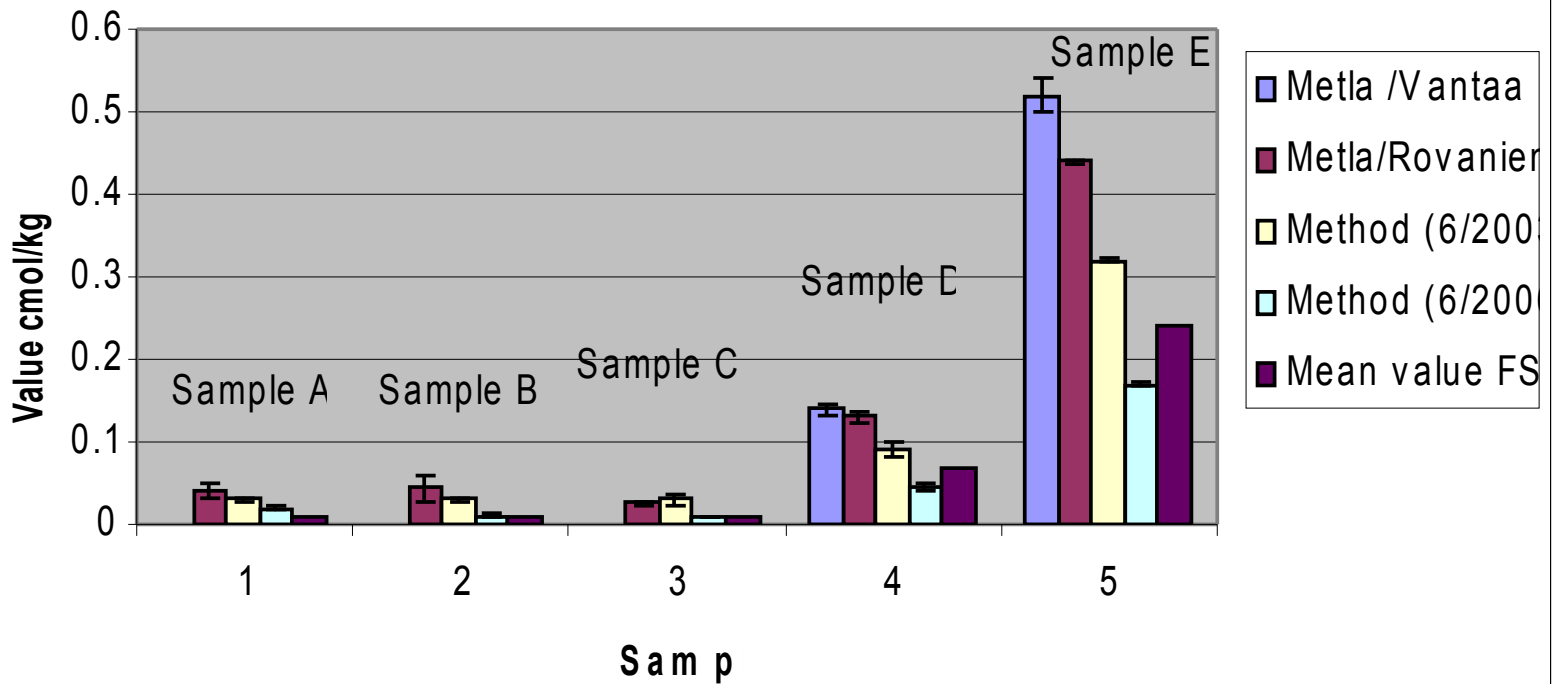
## Exchangeable Acidity in soil samples (6th FSCC)



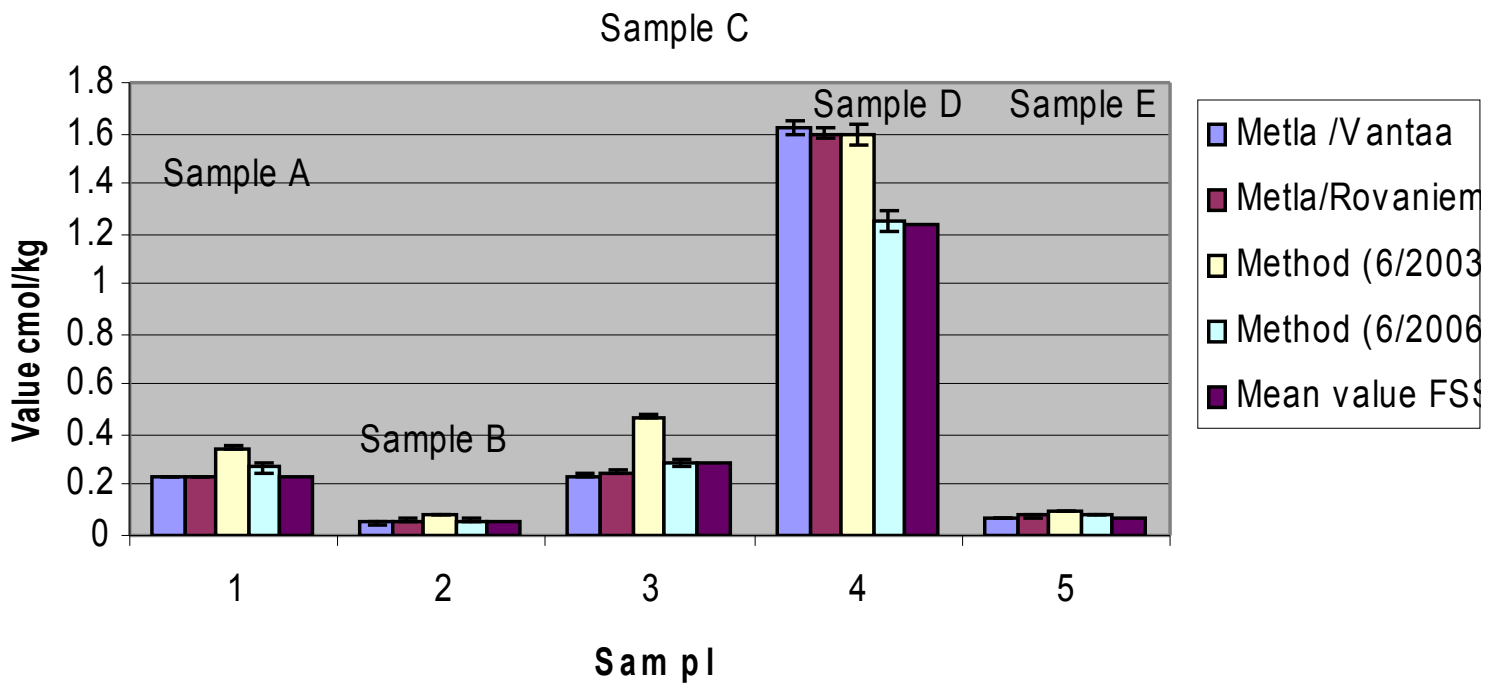
# Exchangeable



## Exchangeable



# Exchangeable





# Conclusions

- comparing to the methods with lower extraction ratio (Metla and old Manual) the new Manual-method (2006/6) gives for organic soils
  - remarkable lower results (40 - 70 %)for:
    - Exchangeable acidity
    - Free acidity
    - Fe
    - Al
  - slightly lower results( 20-30 %) for :
    - Ca
    - K
    - Mg
    - Mn
  
- The effect was not seen for samples with low concentrations.
  
- The new Manual method might need more testing (extraction ratio, shaking time, centrifugation) especially for organic soils.