

# SOIL MONITORING

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## Objectives:

- To establish baseline data for early detection of possible impacts of acid deposition
- To assess the impacts of acid deposition on soils in a comprehensive and systematic way through establishment and maintenance of good quality database

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## Selection of plots:

- Two sites, where soils have different sensitivities to acid deposition
- Two plots, occupying areas from 5m x 5m to 10m x 10m should be selected at each site
- Five subplots should be selected from each plot

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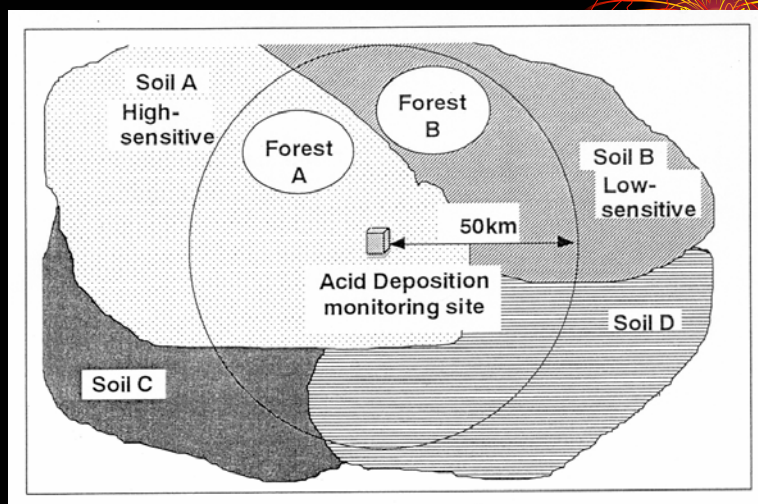


Figure 1. Image of the permanent monitoring sites

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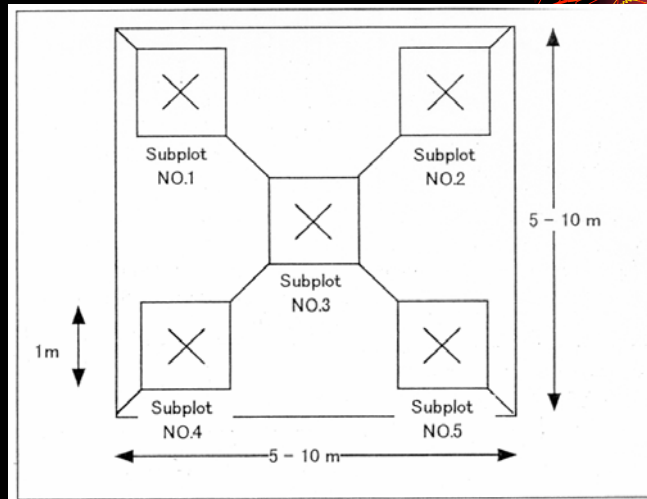


Figure 2. Selection of plots and subplots for soil monitoring

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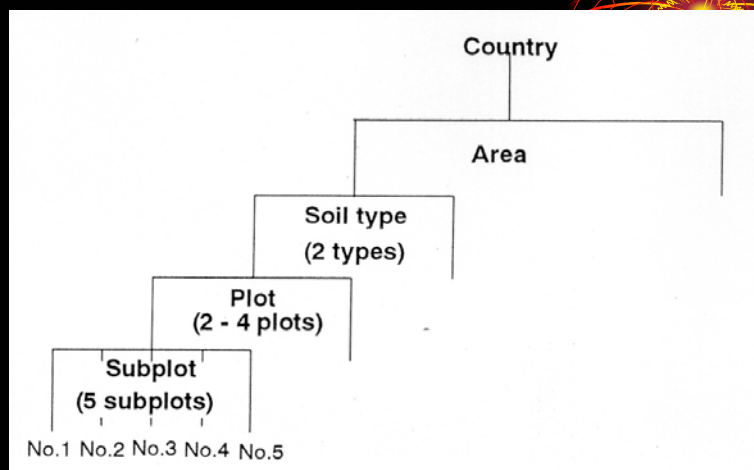


Figure 3. Image of the multi-stage sampling for soil monitoring

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## Soil Profile Description

- **Soil horizons**
- **Soil color**
- **Soil texture**
- **Soil structure**
- **Soil consistence**
- **Soil pores**
- **Soil cutan**

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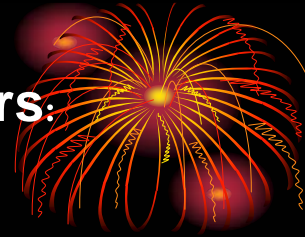
## Soil horizons and layers:

- **O horizons** : Layers dominated by organic material, consisting of undecomposed or partially decomposed litter
- **A horizons** : Mineral horizons which formed at the surface or below an O horizons
- **E horizons** : Mineral horizons in which the main feature is loss of silicate clay, iron, aluminum or some combination of these

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## Soil horizons and layers:



- **B horizons** : Horizons in which the dominant features are illuvial concentration, residual concentration of sesquioxide, coatings of sesquioxides and others
- **C horizons** : Horizons, excluding hard bedrock, that are little affected by pedogenic processes
- **R layers** : Hard bedrock underlying the soil

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## Soil color



- **Color is composed of three variables** : hue, value and chroma
- **Hue is the dominant spectral number and is related to wavelength of light**
- **Value is a measure of degree of darkness or rightness of the color**
- **Chroma is a measure of the quality or strength of spectral color**

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## Soil texture :



- **Soil texture is define as the relative proportion of the various soil separates in a soil material**
- **Textural classes are clay loam, loam, clay loam, silt, silty clay, silty clay loam, sandy loam, sandy clay, sandy clay loam, sandy loam, loamy sand**

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## Soil structure :



- **Granular : Spheroid or polyhedrons, having curved or irregular surfaces which are not casts of the faces of surrounding peds**
- **Blocky : Block or polyhedron, having flat or slightly rounded surfaces which are casts of the faces of the surrounding peds**
- **Prismatic : The dimensions are limited in the horizontal and extended along the vertical plane**
- **Platy : Flat with vertical dimensions limited**

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## Soil consistence :

- **Stickiness : Non-sticky, slightly sticky, sticky, very sticky**
- **Plasticity : Non-plastic, slightly plastic, plastic, very plastic**

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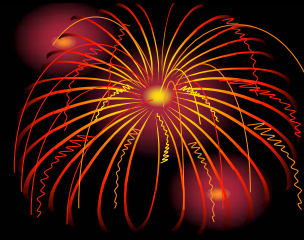
## Soil pores :

- **Interstitial : Predominantly irregular and interconnected**
- **Vesicles : Discontinuous spherical voids of sedimentary origin or formed by compressed air**
- **Vughs : Mostly irregular, equidimensional voids of faunal origin or resulting from tillage or disturbance of other voids**

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## Soil sampling :



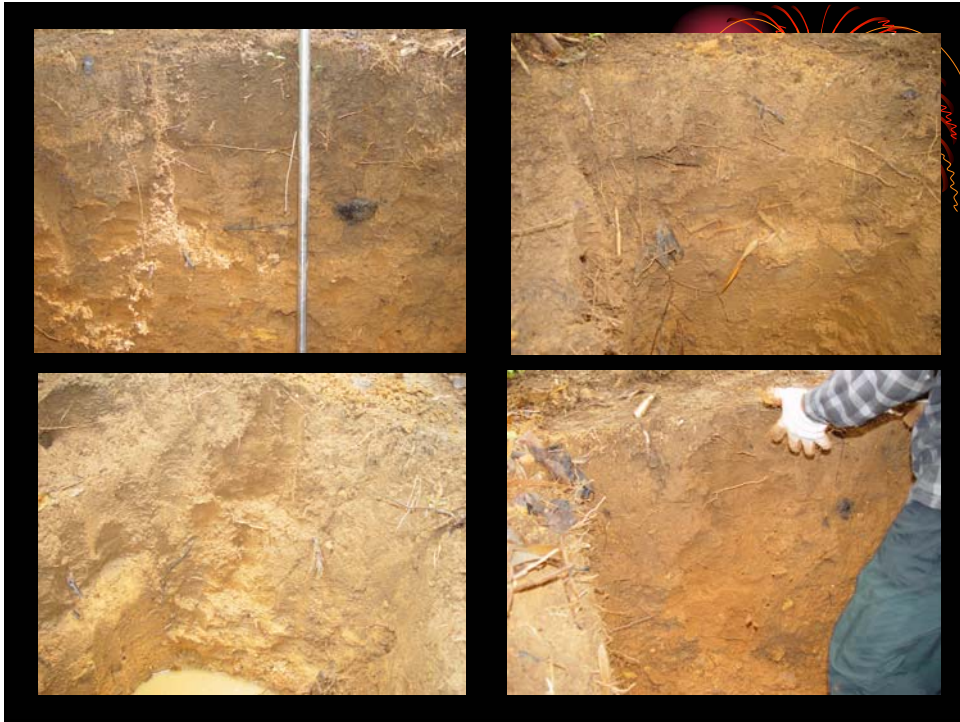
- **Two layers, 0-10 cm and 10-20 cm were collected**
- **The samples were air-dried, ground and passed through 2 mm sieve**

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## ANALYSIS

- **Mandatory analysis :**
  - **Moisture content**
  - **pH (H<sub>2</sub>O and KCl)**
  - **Exchangeable Ca, Mg, K and Na**
  - **Exchangeable acidity**
  - **Effective cation exchange capacity**

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## Optional analysis :

- Exchangeable Al and H
- Total carbon content
- Total N content
- Bulk density
- Penetration resistance

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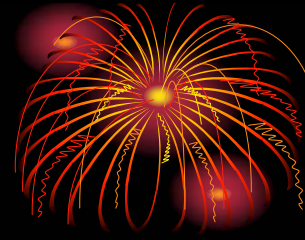
## Volunteer analysis :

- Available phosphate
- Available sulfate

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# INTERPRETATION



## Effects of soil acidification :

- Decrease in soil pH
- Leaching losses of Basic cations
- Mobilization of  $Al^{3+}$  ion
- Reduction in the negative charge of variable charge colloids
- Mobilization of heavy metals

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## Soil pH ( $H_2O$ ) :

### Plot I

	Year 1	Year 3
Uppermost layer	5.51	4.83
Underlying layer	5.42	4.74
Upp layer	6.16	5.89
Und layer	5.82	6.17
Upp layer	6.73	6.67
Und Layer	6.52	6.53
Upp layer	6.17	6.09
Und layer	6.28	6.24
Upp layer		6.63
Und layer		6.15



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# Soil pH (H<sub>2</sub>O) :

## Plot II

	Year 1	Year 3
Upp layer	6.13	5.91
Und layer	5.55	5.45
Upp layer	5.62	5.21
Und layer	5.57	5.29
Upp layer	5.96	5.28
Und layer	5.55	5.52
Upp layer	6.64	6.41
Und layer	6.37	6.14
Upp layer		7.20
Und layer		7.19



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